University Of Pennsylvania

Department of Electrical and Systems Engineering

ESE603 – Discrete-Event System Simulation Theory (Course Outline)

Instructor: Dr. Michael A. Carchidi

Textbooks: (Required)
1.) *Discrete-Event System Simulation* by Jerry Banks, John S. Carson II, Barry L. Nelson and David M. Nicol (Prentice-Hall, 4th Edition @2005, ISBN: 0-13-144679-7).
2.) *Class Notes* by Michael Carchidi,

Week	Topics Covered
1	Introduction to Simulation, When Simulation is and is not Appropriate, Advantages and Disadvantages of Simulation, Areas of Application, Systems and System Environment, Types of Systems (Discrete and Continuous), System Models, Steps in a Simulation Study (Chapter 1).
2	Simulation Examples using Spreadsheets, Queueing Systems, Inventory Systems, Other Examples of Simulation (Sections 2.1 & 2.2).
3	Other Examples of Simulation (Sections 2.3 & 2.4).
4	Statistical Models in Simulation Studies, Review of Basic Principles, Some Useful Discrete and Continuous Statistical Distributions in Simulation Studies (Sections 5.1 – 5.4).
5	The Poisson Process and Empirical Distributions (Sections 5.5 & 5.6).
6	Characteristics of Queueing Models and an Introduction to Simple Queueing Processes, Long-Run Measurements of Performances of Queueing Systems (Sections 6.1 – 6.3).
7	Steady-State Behavior of Infinite-Population Markovian Models, Steady-State Behavior of Finite-Population Models, Network of Queues (Sections 6.4 – 6.6)
8	Properties of Random Numbers, Techniques for the Generation of Pseudo-Random (Sections 7.1 – 7.3).
9	Tests for Random Numbers: Frequency Tests, Runs Tests, Gap Tests, Poker Tests (Section 7.4).

Week	Topics Covered
10	The Inverse Transform Technique for the Generation of Random Variates, Examples (Sections 8.1 & 8.2).
11	The Convolution and Acceptance-Rejection Methods (Sections 8.3 & 8.4).
12	Data Collection, Identifying Distribution with Data, Parameter Estimation and Goodness-of-Fit Tests (Sections 9.1 – 9.4).
13	Simulation Examples Revisited (Chapter 2).
14	Final Project.

Practice Textbook Problems

Chapter	**Problem Numbers:** *Discrete-Event System Simulation* (4^{th} Edition)
1	1, 3 & 5
2	2, 5, 10, 12, 13, 15, 21 & 27
5	1, 5, 6, 9, 11, 13, 17, 20, 22, 27, 29, 31, 35, 36, 39, 41, 46 & 49
6	1, 6, 10, 13, 14, 16, 17, 18 & 21
7	1, 3, 5, 7, 8, 9, 10 & 20
8	1, 5, 7, 9, 12, 13, 15, 17, 22 & 23
9	3, 6, 9, 11, 12, 13, 16, 17 & 21

General Information about the ESE603 Course

1.) **Official Class Time:**	From 5:00 PM to 8:00 PM on Thursday Evenings.
2.) **Prerequisites:**	Some Probability and Statistics
3.) **Instructor:**	Dr. Michael A. Carchidi Email: carchidi@seas.upenn.edu Office Phone: 215-898-8342 (Towne 208) Office Hours: By Appointment
TA/Grader:	See The Electronic Blackboard at https://courseweb.library.upenn.edu/
4.) **Grading Policy:**	A total of 6 homework assignments will be handed out, collected and graded. The average of these will count for 25% of the final grade. A project consisting of various Simulation Problems will count for 25% of the final grade. A midterm in-class exam and an in-class final exam will count for the remaining 25% + 25% of the final grade.
5.) **Textbook:**	The textbook for the course serve as a guild to the material we will cover this semester. However, it does not replace class time and you are expected to keep up with the reading of the textbook. My notes will be posted on Blackboard. Note also that the textbook is in transition from the third edition to the fourth edition. You may purchase either one as this outline is based on both editions.