

BOSTON UNIVERSITY
Department of Mechanical Engineering

Simulation (ME514/EC514)
Fall 2009

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Office hour: Thursdays 1-2 pm

Course objective:

- To go over some of the decision processes in planning and operation of systems.
- To describe how simulation can be used as a decision support system in planning and operation of systems.
- To introduce how to develop models for analyzing real-world production planning and operations decisions.
- To discuss what are the "best" ways to design and perform simulation experiments.
- To introduce how data from simulation should be interpreted to help make sound decisions (statistical data analysis).
- To introduce principles of discrete event simulation and a simulation language (ARENA).
- To introduce principles of Monte Carlo simulation.

Text: *Simulation with Arena, (4th edition)* W. D. Kelton, R. P. Sadowski, D. A. Sadowski, McGraw-Hill, 2004

Simulation language: We will introduce a simulation language, ARENA. In the beginning of the course we will use EXCEL for some examples.

Evaluation: Homework: 25%, midterm exam 30%, Project 35%, class participation 10%.

Tentative Date for midterm: Tuesday November 3 (2-4 pm)

AD account (very important): Some class material will be placed in a folder on AD server. In addition electronic copies of the homework need to be submitted via AD. **To access the material and to submit your homework you need to have an Active Directory (AD) account. To request such an account, go to the link <http://www.bu.edu/computing/accounts/ad/eng> and follow directions.**

Complementary Texts:

1. *Simulation Modeling and Analysis*, by A. Law & D. Kelton, Mc Graw Hill , 4th ed., 1999.
2. *Simulation*, Sheldon Ross, Academic Press, 3rd ed., 2002.

SYLLABUS

1. Simulation for Analysis of Systems: Systems, Models and Monte Carlo Simulation; Application examples
2. Review of Statistical Distributions: Distributions as models; full & partial information
3. Random Variate Generation: Uniform and non-uniform random number generation
4. Statistical estimation: Law of Large Numbers & Central Limit Theorem
5. Discrete-Event Simulation
6. Introduction to ARENA
7. Output analysis
8. Input modeling
9. Performance improvement & optimization
10. Design of Experiments
11. Variance Reduction