

CARNEGIE MELLON UNIVERSITY  
GRADUATE SCHOOL OF INDUSTRIAL ADMINISTRATION  
MINI 2 2002

**45-839: Simulation Modeling for Production**

Section A  
Monday, Wednesday  
3:30 to 5:20 pm

Section E  
Monday  
6:30 to 9:30 pm

**Instructor:** Bahar Biller

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Home: 412-361-6311.

Office Hours: Monday 5:30-6:30 pm, Tuesday and Wednesday 2-3 pm or by appointment.

**Course Description:** This is a hands-on course on computer simulation of business, service, and manufacturing systems that are subject to uncertainty or risk. Spreadsheet simulation using @Risk and manufacturing simulation using Arena will be covered. Upon completion of the course students will be able to develop complex simulation models, design the simulation experiment to be run on the model, and analyze and interpret the results.

**Overview:** The course assumes no prior knowledge of simulation modeling and begins with an introduction to the discrete-event-sample-path view of stochastic processes, which is the basis for discrete-event simulation. Along the way, this view is exploited to make sense of many mathematically intractable processes. There is a *building block* effect for materials covered through the first class and failure to keep up with the suggested assignments will adversely affect your performance.

Your success in this course will be based on your effort and how well you follow the instruction provided. You will work on three different projects. This course work will help you to develop intuition about simulation and gain an understanding of the supporting probability structure that is hidden by most probability languages. So that, at the completion of this course, you will be able to use simulation modeling effectively in order to model more complex systems for real applications.

**Course Materials**

- Suggested reading from Banks, Carson, Nelson, and Nicol. 2001. Discrete-Event System Simulation, 3<sup>rd</sup> edition, Prentice Hall, Upper Saddle River, NJ. (Six copies of this book are available in the Hunt library reserve).
- Kelton, Sadowski, and Sadowski. 2001. Simulation Modeling with Arena, 2<sup>nd</sup> edition. McGraw Hill. (Three copies of this book are available in the Hunt library reserve).
- @Risk from Palisade Corporation.
- Arena from Rockwell Software.
- All lecture notes, together with the in-class demos, are available at the course website.

## Preparation

- Computing, especially the use of spreadsheets and menu-driven programs.
- Probability and statistics at the introductory level.

**Computing:** All course computing can be accomplished in the Posner Hall 147. You may borrow the @Risk software that will be distributed in class and do the computing on your own computer, but there will be no distribution of the Arena software.

**Course Web Page:** A web page will be available for this course at <http://www.cmu.edu/blackboard>. You will need to access this web page for announcements about class, lecture notes, lab assignments, projects, solutions to problems, and exams.

**Assessment:** The course grade will be based on the following components.

Component	Percent of Grade
Simulation Projects (3)	75 %
Final Exam	25 %

## Class Policies

**Reading:** Optional reading assignments are listed on the course schedule.

**Labs:** All lab reports are due by 5 pm Thursday. The last half hour of the lecture will be spent to get you started on the lab assignment. Therefore, the class will move from the Room 145 and Cooper to Room 147 in the last half an hour. I will help you with the labs also during office hours. The lab reports will be checked by the grader, but not graded. However, I will keep track of whether the labs are turned in or not and you will be responsible for the lab material covered in the final exam.

**Projects:** The 3 course projects involve reading a mini-case, developing an appropriate simulation model, running and analyzing a simulation experiment on that model, and making recommendations to technical manager via a written report. Analysis and interpretation are weighted just as heavily as model correctness in these assignments. One project is a spreadsheet simulation; the other two are systems simulations. For all projects, you will return a rough-cut approximation for the problem of interest. That you turn it in will count for the 2 points of the 25 points allocated for each project in the grade assessment.

**Working together:** You will form project teams of four people, but you will do the lab assignments on your own. You are encouraged to discuss lab assignments with your classmates and project problems with other teams. If you get an idea from another student or another team, please give that student or group a credit, e.g., "Group A pointed out to us that ...." Keep in mind that rules of the University regarding to academic integrity will be enforced in the strictest manner.

**Regrades:** Regrades of projects will be considered only if you submit the project along with a **written statement** explaining why you believe it was misgraded **during the following class**. The regrading will be done **by the instructor**.

**Office Hours:** If the listed office hours will not fit in your schedule, then please e-mail me for appointment in advance. Use e-mail to obtain answers at other times, but first check out the **Frequently Asked Questions** to see if someone else has already obtained an answer to your question. The FAQ will be updated throughout the mini semester.

**Makeup Classes:** There will be no classes on November 18, November 27 (Thanksgiving), December 9. Therefore, we will have makeup classes; the dates and locations are announced in the Project & Makeup Schedule.

**Final Exam:** The final exam is open book and notes. It will be a comprehensive, written, multiple-choice exam, but it will not be optional. The date of the final exam is December 14, Simon Auditorium. The exam will start at 2 pm and end at 5 pm, even though it is designed as a 1 hour-50 minute exam.

**VERY IMPORTANT NOTE:** This will be a pretty intense seven-week course. I understand that you will be busy also with other courses. Therefore, I will try my best to make the class as easy as possible for you. I encourage you to ask for immediate help as soon as you need it, e.g., your simulation does not work and you cannot make any progress in your project report. If you would wait for a week to solve the problem and if you cannot solve it at the end of that week, then it is very likely that you will fall behind. **Please, do not hesitate to ask help from me.**