

# COSC 360– Introduction to Computer Simulation and Modeling

## SPRING 2011

1. **Catalog Description:** This course provides an introduction to the fundamental concepts and principles of mathematical modeling and computer simulation. The core emphasis of the course is to provide a familiarization with the use of modeling and discrete event simulation to analyze systems and processes. The goal of such analysis being to improve efficiency, provide an analytical basis for decisions, or to better understand complex system interactions. The course will cover the use of modeling and simulation in a variety of situations including production planning and job shop efficiency in industry; queuing systems such as a bank or call processing center; combat modeling in the military; and examples of continuous and combined continuous/discrete models. To gain insight into the validity of simulations to accurately predict real-world system behavior; the course will challenge students to critically review input/output data and to evaluate the sensitivity of model results when input data and system parameters are varied. Visualization techniques to enhance the understanding of model results and to more thoroughly evaluate simulation output will be covered. Discrete event simulation, Monte Carlo methods, and basic queuing theory are among the specific topics covered. We will discuss various options for developing simulations but all course work requires the use of Arena, a high-level modeling and simulation environment.  
(3 credits).
2. **Prerequisites:**
  - Prerequisites: COSC-173
  - Computing knowledge, particularly basic file management under Windows OS.
  - Probability and stochastic processes, particularly common probability distributions (for example: exponential, normal and uniform distributions).
  - Statistics, particularly confidence-interval procedures based on normal and  $t$  distributions; sample mean and variance.
3. **Course Objectives:** Provide an understanding of the concepts and methods of modeling and computer simulation. Provide the necessary skills to carry out effective systems analysis, evaluate alternatives, and evaluate recommend courses of action using modeling and simulation. Learn to statistically analyze input and output data from simulation models.
6. **Instructor:** Dr. W. Addison Woods
  - **Office location:** One of the rooms across the hall from 345 St. Mary's Hall
  - **Telephone:** 703-379-2342
  - **E-mail address:** [addison@cs.georgetown.edu](mailto:addison@cs.georgetown.edu)
  - **Web site:** <http://cs.georgetown.edu/~addison>
  - **Office hours:** Tuesday 1:00pm-2:30pm; Thursday 1:00pm-2:30pm, & by appointment
7. **Meeting Times and Location:** 10:15am-11:30am, TR, Reiss 262

**8. Textbook and Software Required**

- Required: Kelton, W. David, Randall P. Sadowski, and Nancy B. Swets, "Simulation Using ARENA", 5<sup>th</sup> Edition, McGraw-Hill, ISBN 978-0-07-337628-8
- Optional: Bain, Lee J. and Max Englehardt, "Introduction to Probability and Mathematical Statistics", 2<sup>nd</sup> Edition, Brooks/Cole Cengage Learning, ISBN 978-0-534-38020-5
- The Arena simulation software is available for download at:  
[http://highered.mcgraw-hill.com/sites/0073376280/student\\_view0/arena\\_software\\_download.html](http://highered.mcgraw-hill.com/sites/0073376280/student_view0/arena_software_download.html)

**9. Computer Requirement:** The Arena software is available only for the Windows operating system. You will need to own, or have access to, a Windows computer to take the course. The student version of Arena software is free (for academic use) instructions for downloading the software are in Appendix D of the textbook.

**10. Attendance and Expectations:** Attendance is strongly recommended, no enforcement policy is in effect and attendance is not directly factored into your grade. However, not attending lectures and labs will have an adverse effect on your class participation score. You will be responsible for everything covered in class even if it is not in the textbook. Class participation could include pop quizzes and if you miss one of those there will be no makeup. If you need to leave the classroom during a lecture feel free to do so as quietly as possible. Please turn off cell phones or set them to vibrate prior to the start of class.

**11. Submitting Assignments:** I will post assignments on Blackboard and expect you to post your completed work on or before the deadline. Models, reports, and any other files assigned for homework must be posted no later than the end of the day prior to the due date. All hard copy submissions are due at the start of class the day of the due date. I will specify what items are to be submitted for a homework assignment on the day it is assigned. I prefer that you convert your documents to pdf files prior to submission, but will accept any Microsoft Office compatible file format. Simulation model file types vary depending on the details of the assignment and should **not** be converted to any other format.

**12. Grading Policy:** Your grade will be based on a mid-term exam, final exam, and five mini-projects/homework assignments. The mini-projects/homework assignments may be weighted unequally.

Homework/mini-projects	30%
Mid-term Exam	25%
Class Participation	15%
Final Exam	30%
<b>Total</b>	100%

### 13. Grading Scale:

<i>Grade</i>	<i>Range</i>
A	97-100
A-	93-96
B+	89-92
B	85-88
B-	81-84
C+	77-80
C	73-76
C-	69-72
D+	65-68
D	61-64
F	60 and below

**16. Make-up Exam Policy:** Make-up exams will only be considered for extreme personal hardship such as a documented illness, family funeral, and the like. See me immediately if you need to request a make-up exam.

**17. Lab Guidelines:** During the course of the semester there will be in-class labs. The exercises you work on in the lab will not be collected for grade. However, it is strongly recommended that you attend them because they will benefit you greatly.

The lab assignments will be posted on Blackboard prior to the lab session.

**18. Academic Honesty:** I am required to report any suspicion of academic dishonesty to the Honor Council.

Exams must be entirely your own work. During exams, you are not allowed to view any other students work, show any other student your work, or engage in any discussion unless you need to ask me to clarify something regarding an exam question. In general exams will be closed book and closed notes unless otherwise specified.

All homework assignments and individual projects must be the result your own effort. You may use outside resources such as research papers and books from the library but any solution techniques taken from outside sources must be properly documented. You may receive assistance from other students but are required to fully document the type and extent of assistance that you received. You are strictly prohibited from copying someone else's work or simulation model. You may not email or otherwise provide to someone else the files associated with your simulation model or other homework documents. You may not submit someone else's homework file or files as your own. Regardless of how much assistance you receive you must complete the assignment yourself and build the assigned simulation models yourself. The point is to get help if you need it to understand the material and complete an assignment. But you must produce the final product yourself and fully disclose the amount, and source of, any assistance that you received.

**19. Course Schedule**  
(attached)