Syllabus

CSCI 397: Simulation - Spring 2016

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Office Hours: MWF 10:15-11:15; R 10:00-11:00

Course Description

When real-world experiments are either too dangerous or too expensive to perform, computer simulation is used as an alternative. In addition to considering how to model real-world problems using computer simulation, this course studies other relevant topics including how to generate random data using a deterministic machine and how to collect and display data in a meaningful way.

Course Goals

Upon completion of this course, a successful student will be able to:

- Decide whether Monte-Carol or discrete-event simulation is appropriate for a given problem.
- Verify and validate a discrete-event model and simulation.
- Select and produce appropriate graphical representations for discrete and continuous data.
- Efficiently generate pseudo-random numbers in multiple independent streams and generate discrete and continuous random variables.
- Make written and oral arguments using simulation-generated data.

Required Texts

In addition to the following required text, supplementary readings may be given periodically during the semester.

- *Discrete-Event Simulation: A First Course* by Lawrence M. Leemis and Stephen K. Park

More than other courses, this course is driven by the text. You should expect to spend about an hour before each class session working through the readings. This means reading the text for detail and working to learn vocabulary - not just skimming through the material before class.
To further support your preparation for class, slides for each section will be available online.

Graded Material

- **Reading Quizzes** - For each section of the book that we cover you will be given a short multiple choice reading quiz. You must complete these quizzes *before* the first class where we cover the material. The purpose of these quizzes is to help ensure you have considered the main ideas of the section before we begin a more detailed discussion of the material.
- **Plicker Questions** - At the beginning of each class session I will pose at least one question to the class using Plickers. Each class session will be worth one plicker point plus one point for each question that has a correct answer. This will serve as both a way to take attendance and a simple mechanism to evaluate where you are with the course material.
  If you lose your plicker card or forget to bring it to class you will not earn any plicker points for that day. If your card is lost, come to my office, and I will print you another one.
  You cannot make up plicker points, but I will give every student two free days where you earn credit for the day's questions even if you are late, absent, or have lost/forgot your card.
- **Homework** - The goal of homework problems is for you to explore the topics in more detail, and the homework problems given in the book support this objective. For each section we cover, I will assign one or two of these problems. Each problem requires one to three hours of work:
  i. Re-read the text for required details.
  ii. Design and implement a simulation or modify an existing simulation.
  iii. Run the simulation with a variety of parameters to generate data.

iv. Generate appropriate graphical or tabular representations of the data.

v. Interpret your results.

You are *strongly* encouraged to collaborate with the other students in the course on these problems.

Your solutions should be written in the *other student context.* You should provide enough written explanation so that another student in the class, who did not know how to complete the exercise, could read the submitted material and, without asking questions, understand what should have been done. Written responses that consist entirely of printed source code (even if bullet proof and well documented) are incomplete and poorly written.

Homework problems will be graded using two rubrics on a scale between zero and five.
Correctness:

- **5**: You solved the problem perfectly and/or generated the proper data.
- **4**: Your solution had non-trivial errors.
- **3**: You tried the problem, but either didn't get very far or made serious mistakes.
- **0**: You failed to turn anything in for the problem.

Presentation:

- **5**: Your write-up presents your work in such a way that another student in the course could reproduce your results without asking any questions. Further, your discussion of the problem clearly articulates your conclusions.
- **4**: Your write-up leaves open for interpretation various aspects of your approach or your conclusions are incomplete.
- **3**: Your write-up contains serious omissions. This includes write-ups consisting solely of code snippets and/or data.
- **0**: You failed to turn anything in for the problem.

Note that you can early a "5" on the presentation even if you earn a "3" for the correctness. This would mean that you clearly articulated your attempt to solve the problem, and where you ultimately became stuck.
This scale translates to the standard 90/80/70/60 grade scale. If you earn fives on at least half of the problems you will be in the A range (assuming the remainder of your scores are fours). Plusses and minuses will be used within each range.

- **Midterm** - The midterm will be a take-home test, and it will contain two or three questions similar to homework problems. This test must be completed without *any* collaboration with other students and without using resources other than your notes and the course text.
- **Projects** - Students will complete two projects during the semester. The first will be based on Monte Carlo simulation, and the second project will be based on a Discrete-Event Simulation. For both projects, students will produce a write-up and give an in-class presentation on their work.
- **Final** - The take-home final exam will be distributed in class on the last day of classes and will be due during the scheduled exam period. The format to this exam will be similar to the midterm.

Any change to the final exam schedule must be approved by both me and the dean of students.

Grade Determination

- Reading Quizzes: 5%
- Plicker Questions: 5%
- Homework: 30%
- Midterm: 10%
- Project #1: 15%
- Project #2: 20%
- Final: 15%

Course Policies

- **Late Policy** - I understand that life sometimes gets in the way of getting work done. Consequently, late assignments will be accepted without penalty in the class after the assignment is due. However, this policy should not be used as a crutch, and if you frequently use it I will deduct from your grade. After the next class session, late work will not be accepted unless there are exceptional circumstances.
- **Extensions** - In a similar vein, I am generous with extensions on work if you approach me *before* the day the assignment is due.
- **Absences** - Your attendance is expected at each class meeting, but I understand that students occasionally get sick, have obligations outside

- **Absences** - Your attendance is expected at each class meeting, but I understand that students occasionally get sick, have obligations outside Moravian, and even over sleep. If you do miss class, please send me an email explaining your absence — preferably before the class session. Regardless of your reason for missing class, you are responsible for the contents of reading assignments, handouts, class activities, and class email.
- **Academic Honesty** - Except on tests, you are *encouraged* to discuss the material and work with other students in the course. Specifically, on homework and programming assignments, you may discuss any portion of the assignment with your fellow students. This policy does not allow you to copy another student's work verbatim — you must produce your own code or write-up of the material. Work together to learn the concepts, but keep in mind that you are ultimately responsible for the material on the tests.
- **Disabilities** - Students who wish to request accommodations in this class for a disability should contact the Assistant Director of Academic and Disability Support in the Academic Support Center, Monocacy Hall, lower level, or by calling 610-861-1401. Accommodations cannot be provided until authorization is received from the Academic Support Center.