Math 395: Mathematics of Simulation  
Spring, 2019  
TR 12:00 - 1:15

Instructor: Larry Leemis  
Office: Jepson  
Office hours: TR 2:00-3:00, or by appointment

Purpose:  
This course introduces students to techniques used in the analysis of simulation models. The first half of the course will be spent on determining appropriate input to a simulation model, and the last half will be spent on analyzing the output from a simulation model. Some preliminary homework assignments on simulation programming will be assigned.

Prerequisites:  
Students should have a working knowledge of probability, statistics, and programming.

Textbook:  

Grades:  
Course grades will be determined by these weights:

Homework 30%  
Midterm 30%  
Project 10%  
Final Exam 30%

The grading scale for the course will be:

90 - 100% A  
80 - 90% B  
70 - 80% C

Plus and minus grades may be assigned within each range.

Homework:  
A homework set will be assigned weekly. Each homework set is due at the beginning of the class one week after it is assigned.

Project:  
Each student will submit a research-oriented semester project on a topic involving a simulation technique. The final report is due on the last day of class. A one-page description of the topic is due by Spring break.

Course outline:  
1. Simulation overview  
2. Probability and statistics review  
3. Input modeling  
4. $U(0,1)$ generators  
5. Generating random variates  
6. Time series analysis  
7. Output analysis for a single system  
8. Ranking & selection  
9. Variance reduction techniques  
10. Experimental design, sensitivity analysis, and optimization