Course and Contact Information:

Course: EMSE 3760.10 - Discrete Systems Simulation
Semester: Fall 2017    # of Credit Hours: 3.0
Meeting Time: Monday from 12:45pm to 3:15PM
Location: Tompkins Hall 406 – DSS Lab (22 Computers available)

Instructor:
Name: J. René van Dorp, Professor
Campus Address: 800 22nd Street, Office 2800, Washington DC 20052
Phone: 202-994-6638
E-mail: dorpjr@gmail.com
Office hours: Tuesdays 2:00PM to 4:00PM (by appointment via link on my faculty-page)

Course Description:
An introduction will be provided to the application and theoretical background of systems simulation. Topics include modeling systems dynamics using discrete events, the modeling of service systems through simulation. Theoretical topics include random variable generation, model verification and validation, statistical analysis of output. Simple simulation problems will be introduced using Microsoft Excel. A high-level simulation package SIMIO will be utilized for more complex simulation problems.

Total of 112.5 Student Engagement Hours are divided over: 2.5 hours of class instruction + two exams over 15 weeks. Homework and reading assignment is estimated at a minimum of 4.5 hours per week over 13 weeks of class preparation. Studying/preparing for each exam is estimated at a minimum of 8 hours per each exam (Midterm Exam + Final Exam). Each exam is a 2 and a half hour long exam. Total estimated minimum student engagement: 112.5 hours.

Prerequisite Requirement:
APSC 3115 Engineering Analysis III or
EMSE 4765 Data Analysis for Engineers and Scientists or
EMSE 6020 Elements of Problem Solving and Decision Making or
Required Text:

Required Software:
MS EXCEL – Available in Tompkins 406.
SIMIO – Available in Tompkins 406. A student version of the software is available from:

Recommended Text:
“Discrete Event Simulation” by Banks, Carson and Nelson, Prentice Hall.

Learning Outcomes:
As a result of completing this course, students will be able to:
   1. Use MS EXCEL to simulate a simple queuing system
   2. Model dynamic service systems, e.g. an ATM operation or an Urgent Care Clinic, using the SIMIO simulation software environment
   3. Use data to specify probability distributions for the input parameters of the service system
   4. Verify a simulation model using known queuing theoretical results.
   5. Evaluate systems design scenarios by applying statistical methods on output metrics

Method of Instruction:
One hour and 20 minutes lecture including homework discussion, followed by a 10 minute break.
One hour lecture including breakout session to start with simulation exercises in class. Students are expected to spend a minimum of 4.5 hours (i.e. 1.5 hours per credit hour) on reading and homework assignments outside the class-room. Reading assignments will have to be completed before class. Homework will have to be completed and handed-in on Blackboard and as per the assignment schedule on Blackboard.
Grading:
10% - Class Attendance
20% - Homework
30% - Midterm Exam
40% - Final Exam

**Homework Policy:** For each homework problem a student may be called upon to discuss their solution, so you must be prepared! The rest of the class should be involved in the discussion. Your level of effort will be graded. Not handing in a homework problem will result in 0 points. Homework problems that are handed in on-time and demonstrating an adequate level of effort will be awarded 1 point or more points depending on the level of effort required to complete a homework assignment and as indicated in the homework set assignment. Partial points can be awarded for homework problems. Homework problems that are handed more than one day late will be awarded 0 points. Homework problems that are handed in late, but less than one day late can only receive a maximum of 50% of their total possible effort points. You should each bring electronic files of your homework to class in case you are called upon to show your work to the rest of the class.

**Reading Assignments:**
Reading will be assigned according to the class schedule in this syllabus.

**Midterm and Final Exam:**
Students will complete an in-class simulation Midterm Exam using Microsoft Excel + SIMIO (using a lab computer or the student’s laptop) and an in-class Final Exam using SIMIO. Students will submit with their Midterm Exam and Final Exam electronic files that will be graded. Theoretical questions will be answered in an exam booklet.
Grade Feedback:

I will provide regular feedback on homework and exam grades via a graph and table with the grades. Your percentage grade scores will be posted in Blackboard so you can compare your performance to that of the class overall performance.

Lecture Notes:

Electronic copies of the lecture notes can be downloaded from my Faculty web-page at:

http://www.seas.gwu.edu/~dorpir/EMSE273/Intro.html
<table>
<thead>
<tr>
<th>Session</th>
<th>Date</th>
<th>Monday</th>
<th>Class Topic</th>
<th>Reading Assignments</th>
<th>Homework Assignments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>8/28/2017</td>
<td>Basic Probability Review, Intro to Simulation, Basics of Queuing Theory</td>
<td>Chapter 1, Chapter 2</td>
<td>Homework Set 1</td>
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<tr>
<td>3</td>
<td>9/11/2017</td>
<td>Basic Probability Review, Intro to Simulation, Basics of Queuing Theory</td>
<td>Chapter 2</td>
<td>Homework Set 3</td>
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<tr>
<td>4</td>
<td>9/18/2017</td>
<td>Basics of Queuing Theory, Kinds of Simulation, Simple Queue Simulation in Excel</td>
<td>Chapter 3</td>
<td>Homework Set 4</td>
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<tr>
<td>5</td>
<td>9/25/2017</td>
<td>SIMIO - ATM Simulation</td>
<td>Chapter 4</td>
<td>Homework Set 5</td>
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<tr>
<td>6</td>
<td>10/2/2017</td>
<td>SIMIO - Intermediate Modeling</td>
<td>Chapter 5</td>
<td>Homework Set 6</td>
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<tr>
<td>7</td>
<td>10/9/2017</td>
<td>NO CLASS - FALL BREAK</td>
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<tr>
<td>8</td>
<td>10/16/2017</td>
<td>SIMIO - Intermediate Modeling</td>
<td>Chapter 5</td>
<td>Homework Set 6</td>
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<tr>
<td>9</td>
<td>10/23/2017</td>
<td>Midterm Review, Input Specification</td>
<td>Chapter 6</td>
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<tr>
<td>10</td>
<td>10/30/2017</td>
<td>Midterm Exam - in Class (Session 1 - 6 + Handouts and Spreadsheets)</td>
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<tr>
<td>11</td>
<td>11/6/2017</td>
<td>Discuss Midterm Solution, Input Analysis</td>
<td>Chapter 6, Chapter 7, BCN, Notes on Generation</td>
<td>Homework Set 7</td>
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<tr>
<td>12</td>
<td>11/13/2017</td>
<td>Pseudo Random Number Generation</td>
<td>Chapter 7, BCN, Notes RN Generation</td>
<td>Homework Set 8</td>
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<td>13</td>
<td>11/20/2017</td>
<td>SIMIO - Modeling an EMERGENCY DEPARTMENT</td>
<td>Chapter 7</td>
<td>Homework Set 9</td>
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<td>14</td>
<td>11/27/2017</td>
<td>SIMIO - Modeling an EMERGENCY DEPARTMENT</td>
<td>Chapter 7</td>
<td>Homework Set 10</td>
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<td>15</td>
<td>12/4/2017</td>
<td>SIMIO - Animation and Entity Movement</td>
<td>Chapter 8</td>
<td>Homework Set 11</td>
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<td>16</td>
<td>12/11/2017</td>
<td>FINAL REVIEW</td>
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<td>17</td>
<td>12/12/2017</td>
<td>MAKE-UP DAY - IF NEEDED</td>
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<td>18</td>
<td>12/18/2017</td>
<td>Final Exam - In Class (Sessions 7, 9 - 14)</td>
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University Policy on Religious Holidays:

1. Students should notify faculty during the first week of the semester of their intention to be absent from class on their day(s) of religious observance.

2. Faculty should extend to these students the courtesy of absence without penalty on such occasions, including permission to make up examinations.

3. Faculty who intend to observe a religious holiday should arrange at the beginning of the semester to reschedule missed classes or to make other provisions for their course-related activities.

Support for Students Outside the Classroom:

Disability Support Services (DSS)

Any student who may need an accommodation based on the potential impact of a disability should contact the Disability Support Services office at 202-994-8250 in the Rome Hall, Suite 102, to establish eligibility and to coordinate reasonable accommodations. For additional information please refer to: gwired.gwu.edu/dss/

Mental Health Services 202-994-5300

The University's Mental Health Services offers 24/7 assistance and referral to address students' personal, social, career, and study skills problems. Services for students include: crisis and emergency mental health consultations, confidential assessment, counseling services (individual and small group), and referrals. counselingcenter.gwu.edu/

Academic Integrity Code

Academic dishonesty is defined as cheating of any kind, including misrepresenting one's own work, taking credit for the work of others without crediting them and without appropriate authorization, and the fabrication of information. For the remainder of the code, see:

studentconduct.gwu.edu/code-academic-integrity