

## Digital Simulation Techniques

ESI 6529 Section 2179

**Class Periods:** T2 (8:30 -9:20 am) R2-3 (8:30 -10:25 am)

**Location:** CSE E112

**Academic Term:** Fall 2017

### **Instructor:**

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352-294-7716

Office Hours: Tuesday 10 am to 12 pm, Weil 482

### **Course Description**

**Credits:** 3; Computer programming aspects of digital simulation. Simulation methodology and languages. Design and analysis of simulation experiments as well as applications to solutions of industrial and service system problems.

### **Course Pre-Requisites**

*COP 2271* Computer Programming For Engineers, *STA 4322* Introduction to Statistics Theory, and *ESI 4313* Operations Research 2 with minimum grades of C.

### **Course Objectives**

This 3-credit course intends to introduce the basic techniques for modeling and simulating industrial systems in the presence of uncertainty. You will gain experience in

- Understand the major capabilities and limitations of simulation
- Formulating an appropriate simulation model for a system
- Implementing the model as a computer program
- Evaluating the output of the model

**Materials and Supply Fees:** None

### **Professional Component (ABET):**

This is a course with significant design content. Throughout the semester, students will complete a team project expected to meet specific design criteria.

### **Relation to Program Outcomes (ABET):**

Outcome	Coverage*
a. Apply knowledge	Medium
b1. Conduct experiments	High
b2. Statistical design of experiments	
c. Design	Medium
d. Function on teams	High
e. Solve problems	Low
f. Professional and ethical responsibility	
g. Communicate	Medium
h1. Economic impact	Low
h2. Global, societal, and environmental impact	
i. Lifelong learning	
j. Contemporary issues	
k. Techniques, skills, and tools for degree program	High

\*Coverage is given as high, medium, or low. An empty box indicates that this outcome is not part of the course.

### Required Software

- You must have a laptop to sign up for this course. The laptop is necessary for the in-class exercises, homework assignments, and term project.
- For the class you will require access to the ARENA Software, and the student version is freely available through the following link: <https://www.arenasimulation.com/academic/students>

### Required Materials

- Kelton, Sadowski, and Sturrock, "Simulation Using ARENA", 5th Edition, McGraw-Hill

### Recommended Reading

- Law, "Simulation Modeling and Analysis", 4th Edition, McGraw-Hill

### Tentative Course Schedule

Week	Tues	Class Subject	Chapter	Thur	Class Subject	Chapter
1	8/22	Introduction	1	8/24	Introduction	1/Handout
2	8/29	Simulation Concepts	2	8/31	Simulation by Hand	2
3	9/5	Basic Probability and Statistics	App B	9/7	Basic Probability and Statistics	App B
4	9/12	Lab 1	Handout	9/14	Generating Random Number	12
5	9/19	Generating Random Number	12	9/21	Tour of Arena	3
6	9/26	Lab 2/ Review	Handout	9/28	<b>Exam 1</b>	
7	10/3	Basic Modeling Using Arena	4	10/5	Basic Modeling Using Arena	4
8	10/10	Lab 3	Handout	10/12	Basic Modeling Using Arena	4
9	10/17	Input Analysis	4	10/19	Modeling Detailed Operations	5
10	10/24	Lab 4	Handout	10/26	Modeling Detailed Operations	5
11	10/31	Output Analysis	6	11/2	Output Analysis	6
12	11/7	Lab 5	Handout	11/9	Intermediate Modeling	7
13	11/14	Steady-State Analysis	7	11/16	<b>Exam 2</b>	
14	11/21	Variance Reduction Technique	12	11/23	<i>*Project - No Class*</i>	
15	11/28	<i>*Project - No Class*</i>		11/30	<i>*Project - No Class*</i>	
16	12/5	Project Presentations		12/7	Project Presentations	

### Exams and Quizzes

Exams will be given at 8:30 am on scheduled days. The Industrial & Systems Engineering Department will be using the UF Proctor U to administer exams online to our EDGE- off campus students. However, all on campus students will take their exam on campus in the classroom. Proctor U is a live online proctoring service that allows exam takers to complete their assessment at home while still ensuring the integrity of the exam for the institution. During the Proctor U process students will be monitored by proctors that will be able to see the students, and what they are doing during the exam. There will be no class during the scheduled class time that day. In-class quizzes will be given through Canvas following the announcement on the day of class.

### Lab Classes

Every other Tuesday will be an in-class lab. Following the lab materials, you will be able to ask questions and work together to solve the problems. It would be a good idea to attend the lab so that you will feel comfortable with homework questions.

### **Homework Assignments and Term Project**

There will be three homework assignments. **They will be due the following week's Wednesday by 11:59 pm.** This is individual work. Term project is group work and effort report and peer evaluation is required.

### **Attendance**

Attendance is not required but recommended, though you are expected to be aware of all announcements made in class and know all previously covered material when you attend the following class.

### **Late Assignments and Make-Up Policy**

Late homework assignments will be accepted for 24 hours after the due date with a 25% deduction.

In general, there will be no makeup exams given. However, a student is permitted to make up a missed exam without penalty if he/she has a conflict between an exam/quiz and a scheduled University-approved activity (please do not ask for a make-up exam to attend a job interview). A student needing a make-up exam due to schedule conflicts must notify the instructor at least one week before the day the exam is scheduled for. Excused absences are consistent with university policies in the undergraduate catalog (<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>) and require appropriate documentation.

### **Evaluation of Grades**

Assignment	Total Points	Percentage of Final Grade
Homework (3) Quiz (2)	20 each	20%
Exam 1	100	30%
Exam 2	100	30%
Group Project	100	20%
<i>Total</i>	<i>400</i>	<i>100%</i>

### **Grading Policy**

Grade	Range	Grade Points
A	93-100	4.00
A-	90-92	3.67
B+	87-89	3.33
B	83-86	3.00
B-	80-82	2.67
C+	77-79	2.33
C	73-76	2.00
C-	70-72	1.67
D+	67-69	1.33
D	63-66	1.00
D-	60-62	0.67

\*The weighted average will be rounded to the nearest integer.

More information on UF grading policy may be found at:

<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

### **Students Requiring Accommodations**

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, <https://www.dso.ufl.edu/drc>) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

### **Course Evaluation**

Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at <https://evaluations.ufl.edu/evals>. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at <https://evaluations.ufl.edu/results/>.

### ***University Honesty Policy***

UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor Code (<https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

### ***Software Use***

All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

### ***Student Privacy***

There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see:

<http://registrar.ufl.edu/catalog0910/policies/regulationferpa.html>

### ***Campus Resources:***

#### *Health and Wellness*

#### **U Matter, We Care:**

If you or a friend is in distress, please contact [umatter@ufl.edu](mailto:umatter@ufl.edu) or 352 392-1575 so that a team member can reach out to the student.

**Counseling and Wellness Center:** <http://www.counseling.ufl.edu/cwc>, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

#### **Sexual Assault Recovery Services (SARS)**

Student Health Care Center, 392-1161.

**University Police Department** at 392-1111 (or 9-1-1 for emergencies), or <http://www.police.ufl.edu/>.

#### *Academic Resources*

**E-learning technical support**, 352-392-4357 (select option 2) or e-mail to [Learning-support@ufl.edu](mailto:Learning-support@ufl.edu).  
<https://lss.at.ufl.edu/help.shtml>.

**Career Resource Center**, Reitz Union, 392-1601. Career assistance and counseling. <https://www.crc.ufl.edu/>.

**Library Support**, <http://cms.uflib.ufl.edu/ask>. Various ways to receive assistance with respect to using the libraries or finding resources.

**Teaching Center**, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring.  
<https://teachingcenter.ufl.edu/>.

**Writing Studio, 302 Tigert Hall**, 846-1138. Help brainstorming, formatting, and writing papers.  
<https://writing.ufl.edu/writing-studio/>.

**Student Complaints Campus:** [https://www.dso.ufl.edu/documents/UF\\_Complaints\\_policy.pdf](https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf).

**On-Line Students Complaints:** <http://www.distance.ufl.edu/student-complaint-process>.