

ESI 4523: Industrial Systems Simulation
Section 225D (Class #: 22177)
Department of Industrial and System Engineering
UNIVERSITY of FLORIDA
Spring 2023

Class Time and Location: MWF Period 3 (9:35 - 10:25 am), WEIM 1080	
Instructor: Michelle Alvarado, Ph.D., Assistant Professor, ISE	
Office Location: 474 Weil Hall	
Office Hours: Monday 10:30 – 11:30 am (Weil 474), Thursday 3-4 PM (Zoom)	
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COURSE CATALOG 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 AND CO-REQUISITES:

COP 2271 Computer Programming for Engineers, *STA 4322* Introduction to Statistics Theory *with minimum grades of C.*

COURSE OBJECTIVES:

This 3-credit course intends to introduce you some 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

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.
- **Simio (Simulation Software)**
 - Option 1: The Simio Academic RPS Edition is available at no cost on UF Apps (apps.ufl.edu).
 - Option 2: The Simio Personal Edition is offered to all Simio users and is available at no cost. The Personal Edition can be used to solve most but not all models found in the Simio textbook but is generally not recommended for a formal class where assignments must be submitted. The Personal Edition can be downloaded here: <https://www.simio.com/free-simulation-software/index.php>
 - Option 3: The Simio Student Version is only for students taking a class and is available for a nominal fee (US \$25 for 1 year unlimited access to a \$10,000 product). You can expect more detail on this option in a course announcement.
 - Option 4: Simio has a biannual student competition. If you choose to participate in the competition you will receive complimentary student software valid for the duration of the competition. <https://www.simio.com/academics/student-competition/>

REQUIRED MATERIALS

- Smith, J.S., Sturrock, D.T., & Kelton, W.D. (2018). *Simio and Simulation: Modeling, Analysis, and Applications* (Vol. 5). Simio, LLC. (<https://www.simio.com/publications/Simio-and-Simulation-Modeling-Analysis-Applications-Edition-05/>; option for \$29 full-color ebook)

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*
1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	Medium
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors	Medium
3. An ability to communicate effectively with a range of audiences	Low
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts	Low
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives	High
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions	High
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.	

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

EXAMS (40%)

There will be two exams. Exam 1 will cover Modules 1-4 and any supplementary material presented during this time frame. Exam 2 will cover Module 5-9 and any supplementary material presented during this time frame. ***There will not be a final exam; however, the final exam block is noted on the syllabus schedule as an emergency back-up.***

Exam 1: Mon, Feb 27 (20%)	8:20-10:10 PM, FLG 230
Exam 2: Mon, Apr 17 (20%)	8:20-10:10 PM, FLG 230

LABS (25%)

There will be 5 in-class labs and each will be **followed by a lab homework assignment**. The course instructor and TA will walk you through the lab materials and you will be able to ask questions and work together to solve the problems. The resulting homework will be an individual assignment due 5-7 days later (check CANVAS for specific deadlines).

Lab Dates

Lab 1	W Feb 1
Lab 2	W Feb 8/F Feb 10
Lab 3	W Feb 22/F Feb 24
Lab 4	W Mar 22/F Mar 24
Lab 5	W Apr 5/F Apr 7

CANVAS ASSIGNMENTS (15%)

Other assignments may be given periodically to reinforce course content covered. There are four mechanisms that will result in graded content:

- 1) Canvas questions may be used for in-class participation and knowledge checks.

- 2) Attendance will be taken during labs, presentations, etc.
- 3) Flipped classroom (Modules 4-9) - the instructor will ask that some of the files be submitted to ensure the students are keeping up with the pace of the course and practicing the models.
- 4) Graded quizzes from the flipped classroom videos.

These grades will be tallied and account for 15% of the final course grade.

Not all assignments will be graded. Instead, one or more problems may be randomly selected and graded. All work is assumed to be individual work unless the specific assignment denotes a group activity.

PROJECT (20%)

There will be a team-based term project worth of 20% of the final course grade. Each team will consist of 4-5 students. The goal of the project is to extend material covered in class to a real-world or research problem ideal for simulation. Each team will have the option of:

- 1) Choosing their own topic and research questions.
- 2) Completing a project assigned by the course instructor. Project descriptions and data will be provided.
- 3) Competing in the Simio Simulation Competition. <https://www.simio.com/academics/student-competition/>

Project Deadlines

Project Introduced	Fri, Feb 17	N/A
Title Abstract	Fri, Feb 24	1 page title/abstract
Mid-Term Report	Fri, Mar 24	5 page progress report
Mid-Term Peer Reviews	Mon, Mar 27	1-2 page peer evaluations
Project Presentations	Fri, Apr 21 – Wed, Apr 26	Live presentations + Q&A
Final Report	Fri, Apr 28	<30 page report
Final Peer Reviews	Fri, Apr 28	1-2 page peer evaluations

GRADES:

Grading Evaluation:

Assignment	Percentage of Final Grade
Canvas Assignments (non-Lab)	15%
Lab Grades	25%
Exam 1	20%
Exam 2	20%
Group Project	20%
<i>Total</i>	<i>100%</i>

Grading Scale:

Percent	Grade	Grade Points
93.0 - 100.0	A	4.00
90.0 - 92.9	A-	3.67
87.0 - 89.9	B+	3.33
83.0 – 86.9	B	3.00
80.0 - 82.9	B-	2.67
77.0 - 79.9	C+	2.33
73.0 – 76.9	C	2.00
70.0 - 72.9	C-	1.67
67.0 - 69.9	D+	1.33
63.0 - 66.9	D	1.00
60.0 - 62.9	D-	0.67

More information on UF grading policy may be found at:

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

TENTATIVE SCHEDULE

Week	Dates	Topics	Remark
1	Jan 9/11/13	Module 1: Introduction to Simulation, Begin Module 2	
2	Jan 18/20	Module 2: Stat/Prob/Queue Review	
3	Jan 23/25/27	Module 3: Fundamentals of Simulation	
4	Jan 30/Feb 1/3	Module 3; Lab 1 (W) ; Begin Module 4	
5	Feb 6/8/10	Module 4: First Simio Models, Lab 2 (W/F)	
6	Feb 13/15/17	Module 4: First Simio Model; Project Details	Project Details Announced
7	Feb 20/22/24	Review; Lab 3 (W/F)	Title/Abstract
8	Feb 27/Mar 1/3	Exam 1 ; Module 5 Advanced Simio Models	
9	Mar 6/8/10	Module 5	
10	Mar 13-17	Spring Break	
11	Mar 20/22/24	Module 6: Input Analysis; Lab 4 (W/F)	Mid-Term Report Due
12	Mar 27/29/31	Module 7: Model Data	Mid-Term Team Evaluations Due
13	Apr 3/5/7	Module 8: Animation and Entity Movement; Lab 5 (W/F)	
14	Apr 10/12/14	Module 9: Advanced Modeling with Simio, Project Work Week	
15	Apr 17/19/21	Exam 2 ; Project Work Week	Presentation and Report Due; Final Team Evals Due
16	Apr 24/26	Project Presentations	
17	FINALS WEEK	Final Exam Block: Thur, May 4, 12:30-2:30 PM (Tentative)	

CLASS ATTENDANCE AND RULES:

- Attendance is required and expected. Attendance will be denoted on the course website as *optional* for some dates during the flipped classroom phase of the course.
- Excused absences must be consistent with university policies in the Undergraduate Catalog and require appropriate documentation. (<https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/>)
- University and Departmental guidelines will be applied to categorize excused and unexcused absences.
 - Students unable should notify the instructor of excused absences via email **IN ADVANCE** of the planned absence; in emergency situations the notification should occur **BEFORE THE NEXT SCHEDULED LECTURE**.
 - Regardless of whether an absence is excused or unexcused, students are responsible for any coursework missed as a result of the absence. As most assignments will be posted in advance, students should have sufficient time to complete and submit these assignments in spite of excused activities/absences, unless otherwise discussed and approved by the professor. For excused absences, students are expected to be aware of all announcements made in class and know all previously covered material when attending the following class.
- Class Rules:
 - a. Avoid surfing the internet, texting, using phone/tablet apps, and checking e-mail during class to prevent distracting yourself.
 - b.

COURSE COMMUNICATION:

- Important communication from the course instructor will be posted on the CANVAS “Announcements” page.
- Canvas messaging is the preferred method of communication for the instructor. Please give the instructor **48 hours** to respond to questions. You are highly encouraged to “bump” the messages to the instructor’s attention if you have not received a response within 48 hours.

LATE ASSIGNMENTS AND EXAM MAKE-UP POLICY

Late homework assignments will be accepted for **24 hours** after the due date with a **20% 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.

Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies. Click here to read the university attendance policies:

<https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/>

You are expected to be present without exception and to plan any travel around these dates accordingly. Medical emergencies are of course excluded if accompanied by a doctor's note. A note indicating that you were seen at the health center the day of the exam is not sufficient documentation of a medically excused absence from an exam. The note must say that you were medically unable to take the exam. If you fail to take the exam on the assigned day and do not have a valid excuse, there will be no make-up exam and you will be given a zero (0) on the exam. Employment interviews, employer events, weddings, vacations, etc. are not excused absences.

COURSE CONTENT AVAILABILITY:

The Canvas e-Learning system will be used to disseminate course related material and turning in assignments during the semester. Specific details will be discussed in class.

Our class sessions may be audio visually recorded for students in the class to refer back and for enrolled students who are unable to attend live. Students who participate with their camera engaged or utilize a profile image are agreeing to have their video or image recorded. If you are unwilling to consent to have your profile or video image recorded, be sure to keep your camera off and do not use a profile image. Likewise, students who un-mute during class and participate orally are agreeing to have their voices recorded. If you are not willing to consent to have your voice recorded during class, you will need to keep your mute button activated and communicate exclusively using the "chat" feature, which allows students to type questions and comments live. The chat will not be recorded or shared. As in all courses, unauthorized recording and unauthorized sharing of recorded materials is prohibited.

COURSE EVALUATION:

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at <https://gatorevals.aa.ufl.edu/students/>. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluera.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.aa.ufl.edu/public-results/>.

STUDENTS REQUIRING ACCOMODATIONS:

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center by visiting <https://disability.ufl.edu/students/get-started/>. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

In-Class Recording

Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A “class lecture” is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session.

Publication without permission of the instructor is prohibited. To “publish” means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.

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 honesty and integrity.”***

All students admitted to the University of Florida have signed a statement of academic honesty committing themselves to be honest in all academic work and understanding that failure to comply with this commitment will result in disciplinary action. This statement is a reminder to uphold your obligation as a UF student and to be honest in all work submitted and exams taken in this course and all others. Any form of cheating will be penalized.

On all work submitted for credit by students at the university, 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://sccr.dso.ufl.edu/process/student-conduct-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.

No leniency is given for academic dishonesty or misconduct.

COMMITMENT TO A SAFE AND INCLUSIVE LEARNING ENVIRONMENT:

The Herbert Wertheim College of Engineering values broad diversity within our community and is committed to individual and group empowerment, inclusion, and the elimination of discrimination. It is expected that every person in this class will treat one another with dignity and respect regardless of gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture.

If you feel like your performance in class is being impacted by discrimination or harassment of any kind, please contact your instructor or any of the following:

- Your academic advisor or Graduate Program Coordinator
- Jennifer Nappo, Director of Human Resources, 352-392-0904, jpennacc@ufl.edu
- Curtis Taylor, Associate Dean of Student Affairs, 352-392-2177, taylor@eng.ufl.edu
- Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943, nishida@eng.ufl.edu

SOFTWARE USE:

Every student is expected to have access to a computer and/or tablet with Simio simulation software.

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: <https://registrar.ufl.edu/ferpa.html>

CAMPUS RESOURCES:

Health and Wellness

U Matter, We Care:

Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact umatter@ufl.edu so that the U Matter, We Care Team can reach out to the student in distress. A nighttime and weekend crisis counselor is available by phone at 352-392-1575. The U Matter, We Care Team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 9-1-1.

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

Sexual Discrimination, Harassment, Assault, or Violence

If you or a friend has been subjected to sexual discrimination, sexual harassment, sexual assault, or violence contact the **Office of Title IX Compliance**, located at Yon Hall Room 427, 1908 Stadium Road, (352) 273-1094, title-ix@ufl.edu

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.
<https://lss.at.ufl.edu/help.shtml>.

Career Connections Center, Reitz Union, 392-1601. Career assistance and counseling; <https://career.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://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/>;<https://care.dso.ufl.edu>.

On-Line Students Complaints: <https://distance.ufl.edu/state-authorization-status/#student-complaint>.