

Digital Simulation Techniques
ESI 6529 Section 1FE2/2FED/CAMP
Class Periods: M,W,F (4:05 pm -4:55 pm)
Location: WEB / CSE E122
Academic Term: Spring 2022

Instructor:

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352-294-7731

Office Hours: Monday 9-10 pm (Zoom), Wednesday 2:00-3:00 pm (474 Weil Hall and Zoom), or by appointment

Course Description

Credits: 3; Computer programming aspects of digital simulation. Deterministic simulation, stochastic simulation. Use of 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

Computer programming and probability theory

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

\$57.99

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](https://www.simio.com/academics/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/>
- **Zoom**
 - 100% online course delivery (lectures, office hours, labs, and project presentations) will be held using Zoom. Zoom is a video conferencing software that is accessible via CANVAS.
- **Honorlock**
 - Honorlock will proctor your exams this semester. Honorlock is an online proctoring service that allows you to take your exam from the comfort of your home. You DO NOT need to create an account or

schedule an appointment in advance. **Honorlock is available 24/7 and all that is needed is a computer, a working webcam, and a stable Internet connection.**

- To get started, you will need Google Chrome and to download the Honorlock Chrome Extension. You can download the extension at www.honorlock.com/extension/install.
- When you are ready to test, log into Canvas, go to your course, and click on your exam. Clicking "Launch Proctoring" will begin the Honorlock authentication process, where you will take a picture of yourself, show your ID, and complete a scan of your room. Honorlock will be recording your exam session by webcam as well as recording your screen. Honorlock also has an integrity algorithm that can detect search-engine use, so please do not attempt to search for answers, even if it's on a secondary device.
- Honorlock support is available 24/7/365. If you encounter any issues, you may contact them by live chat, phone (855-828-4004), and/or email (support@honorlock.com).

Required Textbooks

- 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)

Recommended Reading

- Law, "Simulation Modeling and Analysis", 5th Edition, McGraw-Hill, ISBN-10: 0073401323, ISBN-13: 978-0073401324

Tentative Course Schedule

Week	Dates	Topics	Remark
1	Jan 5/7	Course Overview, Introduction to Simulation	
2	Jan 10/12/14	Probability, Statistics, Random Numbers, Variables	Homework 1
3	Jan 19/21	Inverse Transformation, Accept/Reject, Queueing	
4	Jan 24/26/28	Fundamentals of Simulation	Homework 2
5	Jan 31/Feb 2/4	Fundamentals of Simulation/First Simio Models	Homework 3
6	Feb 7/9/11	First Simio Models	Project Details
7	Feb 14/16/18	Exam Review, Exam 1	
8	Feb 21/23/25	Intermediate Modeling	
9	Feb 28/ Mar 2/4	Input Analysis	Homework 4
	Mar 7-11	*** Spring Break ***	
10	Mar 14/16/18	Model Data	
11	Mar 21/23/25	Animation/Entity Movement	Homework 5
12	Mar 28/30/Apr 1	Advanced Modeling with Simio, Variance Reduction	Mid-Term Report/Evals Due
13	Apr 4/6/8	ABM and Hybrid, Review for Exam, Exam 2	
14	Apr 11/13/15	Project Work Week	
15	Apr 18/20	Project Presentations	Presentation and Report Due; Final Team Evals
16	Finals Week	Final Exam Block: Fri, Apr 29, 10 AM - 12 PM	Tentative

Attendance Policy, Class Expectations, and Make-Up Policy

- Attendance is required, i.e., for asynchronous sessions, the lecture recordings should be reviewed, and for synchronous sessions (CAMP section), students should show up to class or the zoom meeting.
- Excused absences must be consistent with university policies in the Graduate Catalog and require appropriate documentation.
(<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>)
- 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
 - Keep Zoom audio on mute unless asking a question, responding, or presenting
 - Avoid surfing the internet, texting, using phone/tablet apps, and checking e-mail during class to prevent distracting yourself. We recommend placing your phone and/or tablet across the room to avoid distractions while attending class or watching videos.
 - For more class rules and expectations, see the “Netiquette Guidelines” posted on the course website.

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 (or 2 business days) 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 within **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. Excused absences must be consistent with university policies in the Graduate Catalog (<https://catalog.ufl.edu/graduate/regulations>) and require appropriate documentation. Additional information can be found here: <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 indicate 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.
- If a student wants to argue their grade, they must do so within the first week of the grade posted.

Exams (40%)

There will be two exams. Exam 1 will cover Chapter 1-4 and any supplementary material presented during this time frame. Exam 2 will cover Chapter 5-9 and any supplementary material presented during this time frame (e.g.

multi-method simulation). 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: Fri, Feb 18 (20%)	75 minute exam, 4-8 PM time block	HONORLOCK
Exam 2: Fri, Apr 8 (20%)	75 minute exam, 4-8 PM time block	HONORLOCK/TAKE-HOME

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 quizzes may be used for in-class participation and knowledge checks.
- 2) Graded quizzes from the flipped classroom (Chapters 4-9) – embedded quizzes and/or file submissions may be required to ensure the students are keeping up with the pace of the course and practicing the models.

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

All work is assumed to be individual work unless the specific assignment denotes a group activity.

Homework and Lab Sessions (25%)

In some weeks there will be lab sessions related to the assigned homework. Homework is submitted as an individual assignment; however, you are permitted to ask questions and work together to solve the problems. It is recommended that you attend the lab so that you will feel comfortable with homework questions.

Project (20%)

- There will be a team-based term project. The project requires the modeling of a stochastic service system. Teams are required to handle input and output analysis, build animation, set-up performance measures, etc. and evaluate alternative system designs. Students are encouraged to consider the Simio Student Competition: <https://www.simio.com/academics/student-competition/>

More details on the course project will be presented in class.

Evaluation of Grades

Assignment	Percentage of Final Grade
Canvas Assignments	15%
Homework (5)	25%
Exam 1	20%
Exam 2	20%
Group Project	20%
Total	100%

Grading Policy

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

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 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.

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 will 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/>.

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 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 Conduct 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. If you have any questions or concerns, please consult with the instructor or TAs in this class.

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

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/>.

COVID-19

- You are expected to wear approved face coverings at all times during class and within buildings even if you are vaccinated.
- If you are sick, stay home and self-quarantine. Please visit the UF Health Screen, Test & Protect website about next steps, retake the questionnaire and schedule your test for no sooner than 24 hours after your symptoms began. Please call your primary care provider if you are ill and need immediate care or the UF Student Health Care Center at 352-392-1161 (or email covid@shcc.ufl.edu) to be evaluated for testing and to receive further instructions about returning to campus.
- If you are withheld from campus by the Department of Health through Screen, Test & Protect, you are not permitted to use any on campus facilities. Students attempting to attend campus activities when withheld from campus will be referred to the Dean of Students Office.
- UF Health Screen, Test & Protect offers guidance when you are sick, have been exposed to someone who has tested positive or have tested positive yourself. Visit the [UF Health Screen, Test & Protect website](#) for more information.
- Please continue to follow healthy habits, including best practices like frequent hand washing. Following these practices is our responsibility as Gators.

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 Resource 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: <http://www.distance.ufl.edu/student-complaint-process>.