

## Operations Research 2

ESI 4313

**Class Periods:** MWF | Period 6 (12:50 PM - 1:40 PM)

**Location:** FLG 0285

**Academic Term:** Spring 2023

### **Instructor:**

Jorge A. Sefair

[jorge.sefair@ise.ufl.edu](mailto:jorge.sefair@ise.ufl.edu)

Office Hours: TBD

### **Teaching Assistant:**

Please contact through the Canvas website

- Shiwei Chai, email: [s.chai@ufl.edu](mailto:s.chai@ufl.edu), office hours (TBD), location (TBD)

### **Course Description**

Catalog Description: Introduces stochastic models and methodologies for analyzing and providing solutions to decision-making problems with uncertainties.

### **Course Pre-Requisites / Co-Requisites**

ESI 3327C and ESI 3215C with minimum grades of C.

### **Course Objectives**

This course teaches the basic concepts of stochastic modeling in operations research. Students will develop and enhance their ability to address various problems that involve randomness/uncertainty, including Stochastic Modeling, Markov Chains, Queuing Analysis, and Stochastic Decision Making. These objectives will be accomplished through: In-class lectures, in-class problem solving activities, and homework assignments.

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

This course introduces the basic concepts of stochastic modeling in operations research. Students will develop and enhance their ability to address various problems that involve randomness/uncertainty.

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

Outcome	Coverage*
1. an ability to apply knowledge of mathematics, science, and engineering	High
2. an ability to design and conduct experiments, as well as to analyze and interpret data	
3. an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	
4. an ability to function on multidisciplinary teams	
5. an ability to identify, formulate, and solve engineering problems	Medium
6. an understanding of professional and ethical responsibility	
7. an ability to communicate effectively	
8. the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	
9. a recognition of the need for, and an ability to engage in life-long learning	Medium
10. a knowledge of contemporary issues	
11. an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice	Medium

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

### **Materials and Supply Fees**

N/A

### **Required Textbooks and Software**

- Title: Introduction to Probability Models [R]
- Author: Sheldon Ross
- Academic Press; 12th edition, 2019
- ISBN: 978-9351073833

### **Recommended Materials**

- Title: Introduction to Probability [B&T]
- Authors: Dimitri Bertsekas and John Tsitsiklis
- Athena Scientific; 2nd edition, 2008
- ISBN: 978-1886529236

### **Course Schedule**

The course Schedule is offered as a guide. This means that it is subject to change, depending on the pace of the class. The instructor might choose to cover parts of the curriculum more extensively, or give extensions to deadlines. The dates of the exams might be subject to change depending on the progress of the class. Exams are assembly.

Week	Topic	Book chapter [Book]	Activity
1 (1/9-1/13)	Review of probability theory: sets, conditional probability, examples.	Chapter 1 [B&T, R]	Homework 1
2 (1/16-1/20)	Review of probability theory: Bayes' rule, independence, binomial probabilities, counting.	Chapter 1 [B&T, R]	Homework 2
3 (1/23-1/27)	Random variables: discrete random variables, continuous random variables, expectation, joint distributions	Chapter 2 [R]	
4 (1/30-2/3)	Random variables: expectation, joint distributions	Chapter 2 [R]	Homework 3
5 (1/6-2/10)	Conditional Probability	Chapter 3 [R]	
6 (2/13-2/17)	Exponential distribution and Poisson process	Chapter 5 [R]	Exam 1
7 (2/20-2/24)	Poisson process, review, and exam	Chapter 5 [R]	
8 (2/27-3/3)	Markov Chains	Chapter 4 [R]	Homework 4
9 (3/6-3/10)	Markov Chains	Chapter 4 [R]	
10 (3/11-3/18)	Spring break		
11 (3/20-3/24)	Continuous-time Markov Chains	Chapter 6 [R]	Homework 5
12 (3/27-3/31)	Continuous-time Markov Chains, review, exam	Chapter 6 [R]	
13 (4/3-4/7)	Queueing Theory	Chapter 8 [R]	Exam 2
14 (4/10-4/14)	Queueing Theory	Chapter 8 [R]	Homework 6
15 (4/17-4/21)	Queueing Theory	Chapter 8 [R]	
16 (4/24-4/28)	Review		

**Final exam: 5/04/2023 @ 7:30 AM - 9:30 AM**

### **Attendance Policy, Class Expectations, and Make-Up Policy**

#### **Attendance Policy**

In-person attendance is strongly encouraged. You are responsible for the announcements made in class. Students are expected to know the material covered in the prerequisite courses. Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found at: <https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>

**This is not a course where you can do well on exams solely by blindly applying formulas.** In order to get the most out of the course, try to stay ahead. Review the material covered in the lectures in advance. In addition to reading, working out extra exercises on your own will help in improving your understanding of the material. With diligent practice, you can prepare yourself to the point where, on exams, instinct takes over and the problems seem straightforward.

## Homework Policy

Homework assignments must be submitted in groups of no more than 2 (two) students. They must be submitted through Canvas by the due date. There will be 6 homework assignments. *The lowest score will be removed automatically.*

## Exam Policy

*The exact time and location of the exams will be communicated during the semester (assembly).* You are expected to be present without exception. Medical emergencies are of course excluded if accompanied by a doctor's note. 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. Excused absences must be 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 Sets (6)	100 each	25%
Exam 1	100	25%
Exam 2	100	25%
Final exam	100	25%
		100%

## Grading Policy

Percent	Grade	Grade Points
93.4 - 100	A	4.00
90.0 - 93.3	A-	3.67
86.7 - 89.9	B+	3.33
83.4 - 86.6	B	3.00
80.0 - 83.3	B-	2.67
76.7 - 79.9	C+	2.33
73.4 - 76.6	C	2.00
70.0 - 73.3	C-	1.67
66.7 - 69.9	D+	1.33
63.4 - 66.6	D	1.00
60.0 - 63.3	D-	0.67
0 - 59.9	E	0.00

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 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.ua.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.ua.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 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.

## **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](mailto:jpennacc@ufl.edu)
- Curtis Taylor, Associate Dean of Student Affairs, 352-392-2177, [taylor@eng.ufl.edu](mailto:taylor@eng.ufl.edu)
- Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943, [nishida@eng.ufl.edu](mailto: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](mailto: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](mailto: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](mailto: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>.