

## Operations Research 2

ESI 4313

**Class Periods:** T,R | Period 5 - 6 (11:45 AM - 1:40 PM)

**Location:** WEIL 0406/Online

**Academic Term:** Spring 2021

### **Instructor:**

Alexander Semenov

[asemenov@ufl.edu](mailto:asemenov@ufl.edu)

Office Hours: Tuesdays and Thursdays, 2:15-3:30, Online (or by appointment)

### **Assistants:**

Please contact through the Canvas website

- Teaching Assistant: Tan Yu [yutan@ufl.edu](mailto:yutan@ufl.edu), office location (TBD), office hours (TBD)
- Undergraduate Assistant: Lina Munoz [linamunoz04@ufl.edu](mailto:linamunoz04@ufl.edu), office location (TBD), office hours (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 4327C and STA 4321 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 and online lectures, in-class and online problem solving activities, 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
- Author: Sheldon Ross
- Academic Press; 11th edition, 2014
- ISBN: 978-0124079489

### **Recommended Materials**

- Title: Introduction to Probability
- 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.

Week	Topic	Book chapter	Exam
1	Review of Probability Theory and Set Theory	Chapter 1	
2	Random variables	Chapter 2	
3	Random variables /Conditional Probability/Expectation	Chapter 2 and 3	
4	Conditional Probability/Expectation, Bernoulli process	Chapter 3 and 5	
5	Bernoulli process/Poisson process	Chapter 5	
6	Poisson process	Chapter 5	
7	Review Session and Midterm Exam		Midterm Exam (TBD)
8	Markov Chains	Chapter 4	
9	Markov Chains Continued	Chapter 4	
10	Continuous-time Markov Chains	Chapter 6	
11	Continuous-time Markov Chains	Chapter 6	
12	Queueing Theory	Chapter 8	
13	Queueing Theory	Chapter 8	
14	Queueing Theory, Reliability theory	Chapter 8 and 9	
15	Reliability theory, Review Session	Chapter 9	

**Final exam: 4/27/2021 @ 7.30 AM - 9.30 AM**

### ***Online Course Recording***

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.

### ***F2F Course Policy in Response to COVID-19***

We will have face-to-face instructional sessions to accomplish the student learning objectives of this course. In response to COVID-19, the following policies and requirements are in place to maintain your learning environment and to enhance the safety of our in-classroom interactions.

- You are required to wear approved face coverings at all times during class and within buildings. Following and enforcing these policies and requirements are all of our responsibility. Failure to do so will lead to a report to the Office of Student Conduct and Conflict Resolution.
- This course has been assigned a physical classroom with enough capacity to maintain physical distancing (6 feet between individuals) requirements. Please utilize designated seats and maintain appropriate spacing between students. Please do not move desks or stations.
- Sanitizing supplies are available in the classroom if you wish to wipe down your desks prior to sitting down and at the end of the class.
- Follow your instructor's guidance on how to enter and exit the classroom. Practice physical distancing to the extent possible when entering and exiting the classroom.
- If you are experiencing COVID-19 symptoms (Click here for guidance from the CDC on symptoms of coronavirus), please use the UF Health screening system and follow the instructions on whether you are able to attend class. Click here for UF Health guidance on what to do if you have been exposed to or are experiencing Covid-19 symptoms.
- Course materials will be provided to you with an excused absence, and you will be given a reasonable amount of time to make up work. Find more information in the university attendance policies.

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

#### ***Attendance Policy***

Attendance is very strongly encouraged - you are responsible for the announcements made in class. Students are expected to know the material covered in the prerequisite courses. When necessary, they are expected to relearn material from these courses on their own.

**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. By the weekend, make sure you have at the least reviewed the material covered in the lectures and readings of the preceding week. 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.

#### ***HW Policy***

Homework assignments are to be submitted at the beginning of the class on the due date. There will be 6 to 8 assignments. *The lowest score will be removed automatically.*

### **Quiz Policy**

There will be five unscheduled unannounced quizzes during the class. There will be no make up quiz. *The lowest score of your quizzes will be removed automatically.*

### **Exam Policy**

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.

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.

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**

<b>Assignment</b>	<b>Total Points</b>	<b>Percentage of Final Grade</b>
Homework Sets (6-8)	100 each	20%
Quizzes (5)	100 each	20%
Midterm exam	100	30%
Final exam	100	30%
		100%

### **Grading Policy**

The following is given as an example only.

<b>Percent</b>	<b>Grade</b>	<b>Grade Points</b>
90.0 - 100	A	4.00
87.0 - 89.9	A-	3.67
84.0 - 86.9	B+	3.33
81.0 - 83.9	B	3.00
78.0 - 80.9	B-	2.67
75.0 - 77.9	C+	2.33
72.0 - 74.9	C	2.00
69.0 - 71.9	C-	1.67
66.0 - 68.9	D+	1.33
63.0 - 65.9	D	1.00
60.0 - 62.9	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.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/>.

### **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/policies/student-honor-code-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
- Robin Bielling, Director of Human Resources, 352-392-0903, [rbielling@eng.ufl.edu](mailto:rbielling@eng.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:** <http://www.counseling.ufl.edu/cwc>, 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 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://care.dso.ufl.edu>.

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