

IE 398 – Simulation

Section CV, Spring 2020

Meeting times

Component	Section	Meeting time	Meeting place
Lectures	CV	TR 2.00pm–3.20pm	103 Transportation Building
Labs	CV	TBA (during lecture hours)	TBA

Course information

Credit hours:	3
Instructor:	Chrysafis Vogiatzis
Email:	chrys@illinois.edu
Course website:	compass2g.illinois.edu
Office (not for office hours):	201A Transportation Building
Office hours (at 215 TB):	TR 4.00–5.00pm, W 10.00–noon

Some notes:

- Feel free to visit me in my office at 201A TB; however, I will be keeping scheduled office hours at 215 TB throughout the semester (more space, and nicer layout for collaboration).
- I will be more than happy to meet with you outside office hours *by appointment*.
- Online office hours will also be provided before important class events, such as exams. Those will be announced in class and on compass.

Teaching assistants

Wenda Zhang (wzhang95@illinois.edu)

- Office hours: TBA.

Rachneet Kaur (rk4@illinois.edu)

- Office hours: TBA.

Course communication

All communication of announcements, assignments, and other materials will be done through the course website on compass2g.illinois.edu. You can also email the instructor and teaching assistants; when doing so, please begin your email subject line with [IE 398]. This helps with class organization and will ensure a faster reply.

Textbook

Simulation with ARENA by W. David Kelton, Randall Sadowski, and Nancy Zupick, 6th ed., ISBN-13: 978-0073401317 , ISBN-10: 0073401315.

Software

ARENA by Rockwell Automation. **Please note that the software only runs on Windows.**

Course description

Use of discrete-event simulation in the modeling and analysis of complex systems subject to uncertainty. At the end of the course, the students should be able to develop simulation models of complex, real-life systems; design simulation experiments; analyze and interpret the results of the simulation; and effectively organize and present simulation-based projects. The topics of the course include input modeling, selecting probability distributions, and generating random variables, sensitivity analysis, simulation optimization, and reporting and analyzing simulation outputs.

Target audience

Undergraduate engineering students at their junior year with an interest in decision-making under uncertainty and the analysis of complex systems through simulation techniques.

Learning outcomes

Upon completion of the course and all of its topics, students should have the abilities and tools to:

- develop simple and complex simulation models of real-life systems ^{1,2};
- design simulation experiments, analyze the results, and interpret their findings ^{1,2,6};
- use ARENA proficiently ^{1,2,6};
- formulate and conduct simulation experiments and perform sensitivity analysis in order to reach statistically sound conclusions ^{1,2,6};
- work in a team to design simulation experiments, and report and communicate simulation results to general audiences ^{3,4,5}.

Note: ABET outcomes 1, 2, 6 that are covered with the course are (for more information, please visit <https://www.abet.org/accreditation/accreditation-criteria/criteria-for-accrediting-engineering-programs-2019-2020> and check Criterion 3):

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
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.
3. an ability to communicate effectively with a range of audiences.
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.
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.
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

Exams

There are three exams in the class: two midterm exams and a final exam. Due to the structure of the class, all exams are cumulative with the material up to that point (for example, material from the first exam are naturally included in the second exam, and so on). The final exam will be given (as designated by the University of Illinois) on **Thursday, May 14, 2019 8.00am–11.00am**. The final exam accounts for 30% of the grade of a student in the class. Each midterm exam will count towards 20% of the grade of a student for a total of 40% of the grade in the class.

The two midterm exams will be announced in class at least one week before they are scheduled to take place. Tentatively, you may consider them to take place on or near March 10 (midterm #1) and on or near April 14 (midterm #2). A review session will take place in class during the previous lecture to help you best prepare for the material in the exams.

Make-up exams will **only** be provided if notified at least three days prior to the exam date. In the case of an emergency, a make-up exam will be provided with the proper and appropriate documentation justifying your absence no later than one week from the date of the exam.

Lab and homework assignments

There will be 6-8 lab and homework assignments throughout the course of the semester. Lab and homework assignments will be announced during the previous class. An announcement before every assignment will also be posted on the class website. No make-up or late assignments are going to be allowed. The average grade of a student in the assignments will count towards 20% of the grade of the student in the class.

The deadline for assignment submission will be end of day (11.59pm) unless otherwise posted. You are encouraged to work with other students on an assignment either inside or outside the classroom, however copying violates the honor code and is not allowed under any circumstances.

Term project

A project is to be submitted as part of the class. Students are encouraged to work in groups of four. The final output of the term project will be a 5-6 page report, a series of simulation code files, and a small (approximately 8-10 slides) presentation. The important milestones are summarized in Table 1. As a disclaimer, milestone dates may shift depending on the class progress. The project will count for 15% of the grade of a student in the class.

Table 1: The important term project milestones and approximate deadlines.

Activity	Before or on
Form group	Friday 01/31
Meet with Dr. Vogiatzis	Friday 02/14
Submit one page project proposal	Friday 02/28
Collect data/preliminary analysis	Friday 04/03
Meet with Dr. Vogiatzis	Friday 04/17
Submit all project files	Friday 05/01
Submit peer evaluation forms	Monday 05/04

Re-grade policy

If you believe that an exam, lab, or homework assignment was graded incorrectly, please reach out to me at the latest one week after the announcement of the result. In your email requesting the re-grade, please add an explanation of where and why a re-grade is desired.

Attendance

Lectures. While attendance in lectures is not mandatory, it is highly recommended. Students will be responsible for all of the material taught in the classroom. Important discussions and in-class activities will take place during class.

Lab assignments. Whenever a lab assignment is to take place, attendance is mandatory. Attendance during lab assignments accounts for part of the assignment grade.

General class policies

- Be courteous and kind to others (including me and the teaching assistants!).
- Please silence your cell phones and other electronic devices.
- Do not arrive late for class. If you arrive after the class has started, please sit towards the back of the classroom.

Grading policy

A: [93, 100], A-: [90, 93), B+: [87, 90), B: [83, 87), B-: [80, 83), C+: [77, 80), C: [73, 77), C-: [70, 73), D+: [67, 70), D: [63, 67), D-: [60, 63), F: [0, 60).

Lab and homework assignments	15%
Midterm exam 1	20%
Midterm exam 2	20%
Final exam	30%
Term project	15%
Total	100%

Academic integrity

We will follow articles 1-401 through 1-406 of the Student Code (you can find the articles beginning at <http://studentcode.illinois.edu/article1/part4/1-401/>). This rule defines infractions of academic integrity, which include but are not limited to cheating, fabrication, and plagiarism. You are responsible for following these guidelines. If you have any questions about whether something would be an infraction, consult with the instructor before proceeding.

Request for special accommodations

To obtain disability-related adjustments and/or auxiliary aids, students with disabilities must contact the course instructor and the Disability Resources and Educational Services (DRES) as soon as possible. To contact DRES, you may visit 1207 S. Oak St., Champaign, call 217.333.4603, email disability@illinois.edu, or go to the DRES website (at <http://disability.illinois.edu>).

Run > Hide > Fight

Emergencies can happen anywhere and at any time. It is important that we take a minute to prepare for a situation in which our safety or even our lives could depend on our ability to react quickly. When we're faced with almost any kind of emergency – like severe weather or if someone is trying to hurt you – we have three options: Run, hide or fight. Please consult the provided attachment to the syllabus for more information.

Updates to the syllabus

The contents of the syllabus and the policies described are subject to change. If that happens, all the changes will be announced and described on the course website.

Prepared by:
Last updated:

Chrysafis Vogiatzis
January 20, 2020