

USC Viterbi School of Engineering

ISE 580 Performance Modeling with Simulation

Spring 2019, Wed, 6:40-9:20 pm

Location: OHE 132

Instructor: Dr. Parisay

<https://ise.usc.edu/directory/faculty/profile/?lname=Parisay&fname=Sima>

Office: OHE 310U

Office Hours: Mon and Wed 4:30-6 pm

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Teaching Assistant: Jialin Yin

Office: GER 242B

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IT Help:

Hours of Service:

Contact Info:

Catalog Course Description

Introduction to modeling and analysis of stochastic systems, with an emphasis on discrete-event simulation of non-Markovian systems.

Learning Objectives

This course is designed for those with minimum background in this field and concentrates on application of these techniques.

- Application of queuing systems to prepare for simulation
- Knowledge of concepts in discrete-event simulation and their applications.
- Creating simulation model and animation using a commercial simulation software (Arena)
- Model verification and validation
- Input modeling, statistical output analysis, report writing
- Experimentation, system improvement

Prerequisite(s): Probability and statistics, including hypothesis testing, and introductory computer programming

Co-Requisite (s): None

Concurrent Enrollment: None

Recommended Preparation: None

Course Notes

The course materials are in the Course Reader and on the D2L.

Technological Proficiency and Hardware/Software Required

Students need to download student version of Arena (free) from the related web site. This software works with Windows operating system. Alternatively, you can access professional version of Arena software on Virtual Desktop.

Required Readings and Supplementary Materials

Required: Course Handouts (Included in Course Reader, course D2L, and in class) by Dr. Parisay. The Course Reader can be purchased from the USC Bookstore.

Required: Simulation with Arena, 6th Edition, W. David Kelton, Randall P Sadowski, Nancy B. Zupick, McGraw-Hill, 2015, ISBN: 978-0-07-340131-7. This book can be purchased from the USC Book store or any other sources.

Required software: Arena Software can be downloaded for free from the web site below <http://www.arenasimulation.com/>

Reference: Simulation Modeling & Analysis with Expertfit Software, 5th Edition, Averill M. Law, McGraw-Hill, 2015. ISBN: 0073294411 ISBN 978-0-07-340132-4

Reference: Discrete Systems Simulation, B. Khoshnevis, McGraw-Hill, Inc., 1994 or Discrete Systems Simulation, B. Khoshnevis and K. Palmer, ISE, USC, 2014

Description and Assessment of Assignments

- **Midterm exam** will be in-class based on the schedule, closed book, and 1.5 hours in length. The Makeup exam is only considered under documented emergencies, such as being hospitalized.
- **Final exam** will be held at the completion of all classes based on the University schedule, closed book, and 2 hours in length. Makeup exam is only considered under documented emergencies, such as being hospitalized.
- **Homework** are assigned each week on Thursdays. You will submit your solution as a Word file to D2L before the next class on Wednesdays. No late homework will be accepted. No makeup homework will be considered. HW solution will be posted within few days after the due date. You need to refer to the posted solution as part of your next HW. HW is expected to be typed as much as possible and professionally done. A total of 9 HW will be assigned. 6 HW will be randomly selected for grading, each 3 points. Grading is based on your effort (not the exact solution). The sum of the best 4 grades of HW will be used as the total points for HW.

- **Quiz/Participation** may be conducted at the beginning of a class or any time during the lecture. Only 4 quizzes will be randomly conducted and collected for grading, each 4 points. Quizzes are based on what was covered during the previous session and the recent HW. No late quiz or makeup quiz will be considered. The sum of the best 2 grades of quizzes will be used as the total points for quiz.
- **Project/Case study:** The project in this class is a team activity. I will assign the teams after the Midterm. Some information in this respect is included in your Course Reader and more details will be posted on D2L later on. The purpose of the project is for you to utilize information you have learned during this class and to prepare a professional report. The project is delivered as a hard copy report on the last class session, as well as posting the Word file of the report and the Arena models on D2L.

Grading Breakdown

Assignment	Points	% of Grade
Midterm	20	20
Final Examination	30	30
Homework (4 best out of 6)	12	12
Quizzes (2 best out of 4)	8	8
Project: initial report and final report	30	30
total	100	100

Total points will be curved for the final letter grade. Letter grade with minus and plus are also considered. Please refer to another file called “Grading policy” on D2L for more details.

Assignment Submission Policy

Assignments should be submitted to the D2L based on the schedule of the class. It should be professionally done. I may require hard copy as well for some assignments. No late assignment is accepted. No makeup quiz is considered. Makeup exam is considered only under documented emergencies.

Additional Policies

Cellular phones should be turned off (or in silence) in class. No texting in class. Computers can only be used for class related material.

Please bring your Course Reader to every class session.

Course Schedule: A Weekly Breakdown

Readings and Homework: They will be posted on D2L as lecture proceeds.
Homework is due on Wed on D2L before 6 pm.

Week	ISE 580 Topics Tentative Weekly Activities	Readings	Deliverable /Due Dates
1 Jan 9	Introduction to the Course Queuing Concepts and Theory Background: Data summary, probability		
2 Jan 16	Queuing Theory: Analysis and Report Writing Background: Confidence Interval, Hypothesis Testing	3a, 3b, 5a	Homework
3 Jan 23	Introduction to Simulation Concepts, Logical Model	4a, 5b	Homework
4 Jan 30	Introduction to Arena Software	7a, 7b, 7c	Homework
5 Feb 6	Verification, Simulation and Arena	8a, 7f	Homework
6 Feb 13	Simulation and Arena	8a, 9a	Homework
7 Feb 20	Midterm (1.5 hour) Analysis of Performance Measures and Report Writing		
8 Feb 27	Goodness of Fitness, Input Analyzer	10a	
9 Mar 6	Output Analyzer	4b, 13a	Homework
10 Mar 13	Spring break		

Week	ISE 580 Topics Tentative Weekly Activities, Cont.	Readings	Deliverable /Due Dates
11 Mar 20	Design of Experiments, Process Analyzer	14a, 14b	Homework
12 Mar 27	Simulation and Arena	15a, 15b	initial report project
13 Apr 3	Material Handling and Animation	12a	Homework
14 Apr 10	Advanced Discussions: Issues in Analysis of Performance Measures and Experimentation	12a	Homework
15 Apr 17	Miscellaneous Discussions		
16 Apr 24	Miscellaneous Discussions		Final project report
17 May 1	Final Exam 7-9 pm		

Statement for Students with Disabilities

Any student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to me (or to TA) as early in the semester as possible. DSP is located in STU 301 and is open 8:30 a.m.–5:00 p.m., Monday through Friday. Website and contact information for DSP:

http://sait.usc.edu/academicsupport/centerprograms/dsp/home_index.html, (213) 740-0776 (Phone), (213) 740-6948 (TDD only), (213) 740-8216 (FAX) ability@usc.edu.

Statement on Academic Integrity

USC seeks to maintain an optimal learning environment. General principles of academic honesty include the concept of respect for the intellectual property of others, the expectation that individual work will be submitted unless otherwise allowed by an instructor, and the obligations both to protect one's own academic work from misuse by others as well as to avoid using another's work as one's own. All students are expected to understand and abide by these principles. *SCampus*, the Student Guidebook, (www.usc.edu/scampus or <http://scampus.usc.edu>) contains the University Student

Conduct Code (see University Governance, Section 11.00), while the recommended sanctions are located in Appendix A.

Emergency Preparedness/Course Continuity in a Crisis

In case of a declared emergency if travel to campus is not feasible, USC executive leadership will announce an electronic way for instructors to teach students in their residence halls or homes using a combination of D2L, teleconferencing, and other technologies.

Statement on Academic Conduct and Support Systems

Academic Conduct:

Plagiarism – presenting someone else’s ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in *SCampus* in Part B, Section 11, “Behavior Violating University Standards” policy.usc.edu/scampus-part-b. Other forms of academic dishonesty are equally unacceptable. See additional information in *SCampus* and university policies on scientific misconduct, <http://policy.usc.edu/scientific-misconduct>.

Support Systems:

Student Counseling Services (SCS) – (213) 740-7711 – 24/7 on call

Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention. engemannshc.usc.edu/counseling

National Suicide Prevention Lifeline – 1 (800) 273-8255

Provides free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week. www.suicidepreventionlifeline.org

Relationship and Sexual Violence Prevention Services (RSVP) – (213) 740-4900 – 24/7 on call

Free and confidential therapy services, workshops, and training for situations related to gender-based harm. engemannshc.usc.edu/rsvp

Sexual Assault Resource Center

For more information about how to get help or help a survivor, rights, reporting options, and additional resources, visit the website: sarc.usc.edu

Office of Equity and Diversity (OED)/Title IX Compliance – (213) 740-5086

Works with faculty, staff, visitors, applicants, and students around issues of protected class. equity.usc.edu

Bias Assessment Response and Support

Incidents of bias, hate crimes and microaggressions need to be reported allowing for appropriate investigation and response. studentaffairs.usc.edu/bias-assessment-response-support

The Office of Disability Services and Programs

Provides certification for students with disabilities and helps arrange relevant accommodations. dsp.usc.edu

Student Support and Advocacy – (213) 821-4710

Assists students and families in resolving complex issues adversely affecting their success as a student
EX: personal, financial, and academic. studentaffairs.usc.edu/ssu

Diversity at USC

Information on events, programs and training, the Diversity Task Force (including representatives for each school), chronology, participation, and various resources for students. diversity.usc.edu

USC Emergency Information

Provides safety and other updates, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible. emergency.usc.edu

USC Department of Public Safety – UPC: (213) 740-4321 – HSC: (323) 442-1000 – 24-hour emergency or to report a crime.

Provides overall safety to USC community. dps.usc.edu