

The University of Texas at El Paso



Industrial Systems Simulation

Course Number: IE 4353

Fall 2021

Class Details:

Instructor : Sreenath Chalil Madathil, Ph.D.
Schedule : Monday 3:00 PM – 5:50 PM
Wednesday 3:00 PM – 4:50 PM
Location : Classroom Building C205
Office Hours : MW 1:30 PM – 3:00 PM at Zoom

Email : schalil@utep.edu

Teaching Assistants : Holguin, Joshua jholguin23@miners.utep.edu
: Aimee Montalvo
: Amit Kumar Saha
TA Office Hours : TBD

Course Objectives:

Discrete event simulation (DES) is a method of simulating the behavior and performance of a real-life process, facility, or system. DES models help to depict a complex system's behavior as a series of well-defined and ordered events and work well in virtually any process where there is variability, constrained or limited resources or complex system interactions. Students will investigate the use of discrete-event simulation to solve mathematically intractable problems in stochastic modeling. The course emphasizes the fundamental concepts of, and proper interpretation of results from discrete-event simulation models.

The primary program objectives pursued in this course are as follows:

- be familiar with commonly used techniques in simulation, such as random number and variate generation, input modeling, events and event types, run-length issues, auto-correlated output, and presentation of simulation results.
- be able to identify problems from their specific domains suitable for simulation, and correctly approach the modeling of those problems, including identification of simulation goals and necessary real-world data.
- be able to implement and execute discrete-event simulation models and correctly interpret and present the results.

Required Reference Book:

- Simulation Modeling with SIMIO: A Workbook - Fourth Edition by Jeffrey A. Joines and Stephen Roberts. E-book can be purchased at <https://simio.contentshelf.com/product?product=I151119000004A16>

Preferred Reference Book:

- SIMIO and Simulation: Modeling, Analysis, Applications - Fifth Edition by Jeffrey S. Smith, David T. Sturrock and W. David Kelton
 - Free ebook available at <https://textbook.simio.com/books/SASMAA6.php>

Other Reference Books:

- Simulation Modeling and Analysis, Fifth Edition, Averill M. Law, Ph.D. McGraw-Hill, 2015

Prerequisites:

Knowledge of probability and statistics. Many topics, such as the generation of realizations from probability distributions and analysis of simulation input/output require a variety of statistical tools.

Technology Requirements:

This course has been designated as a laptop course. Most class activities will be conducted using laptops. You will need to bring your laptop every class unless otherwise noted explicitly. In general, I assume that each student has a laptop with the appropriate software. You will need to have access to a computer/laptop, scanner, webcam, and microphone. You will need to download or update the following software: Microsoft Office, Adobe Acrobat Reader, Windows Media Player, QuickTime, and Java. Check that your computer hardware and software are up-to-date and able to access all parts of the course. Suppose you do not have word-processing software. In that case, you can download Word and other Microsoft Office programs (including Excel, PowerPoint, Outlook and more) for free via UTEP's Microsoft Office Portal. Click the following link for more information about [Microsoft Office 365](#) and follow the instructions. **SIMIO works only on a Windows Operating System.** IMPORTANT: If you encounter technical difficulties beyond your scope of troubleshooting, please contact the [UTEP Help Desk](#) as they are explicitly trained in assisting with the technological needs of students. Please do not contact me for this type of assistance. The Help Desk is much better equipped than I am to assist you!

Course Materials and Office Hours:

I will post lectures, links to other relevant reading materials, homework questions, and project details on Blackboard. All submissions MUST be submitted through Blackboard. Paper submissions will not be accepted. The office hours are on Monday between 8:00 AM and 10:00 AM in Blackboard Collaborate. However, I can also meet with you using video conferencing services such as Microsoft Teams based on a pre-determined meeting time.

Email: UTEP e-mail is the best way to contact me. I will make every attempt to respond to your e-mail within 24-48 hours of receipt. When e-mailing me, be sure to email from your UTEP student account and please put the course number in the subject line. In the body of your e-mail, clearly state your question. At the end of your e-mail, be sure to put your first and last name, and your university identification number.

Course Projects:

All students are required to do a course project in this class. The project will be based on the SIMIO Student Simulation Competition and follows all the requirements for the competition. Students are strongly encouraged to form teams (maximum two members per team) to work on the project.

Assignments and In-class Activities

Students are strongly encouraged to form teams (maximum 2 members per team) to work on all course homework assignments. You can use course’s discussion boards to find your team members if you don’t know anyone else. I will grade only the last submitted submission for each assignment and activity by the team. Two complaints of non-performance/non-participation about the other teammates will result in reduction of grade by one grade. Four cumulative complaints will result in an F-grade.

Activities, Quizzes, and Exams are individual submissions.

Exam Make-up Policy:

There will be **NO** make-up policy for exams, homework, and quizzes in this class.

Late-Submission Policy:

All late submissions for homework, poster presentation, and exams are automatically awarded zero points.

Evaluation:

Students will be evaluated according to their performance on two examinations, class projects, homework, and quizzes. Class members are expected to be prepared for each class by reading the assigned material before each session, and by attending each class session.

Grades:

A	90 and above
B	≥ 80 and < 90
C	≥ 70 and < 80
D	≥ 60 and < 70
F	< 60

The course grade will be aggregated as follows:

	Item	Weight
1	Mid-term Examination	10%
2	Final Examination	10%
3	Project	30%
4	Assignment	25%
5	Activities	20%
6	Attendance	5%
	Total	100%

Blackboard Submission

I strongly suggest that you submit your work with plenty of time to spare in the event that you have a technical issue with the course website, network, and/or your computer. If you are experiencing difficulties submitting your work through the course website, please contact the UTEP Help Desk. It is your responsibility to submit the assignments in Blackboard before the due date.

Excused Absences and/or Course Drop Policy

The students are expected to participate in all class sessions and activities. It is the responsibility of the student to inform each instructor of extended absences. When, in the judgment of the instructor, a student has been absent/non-participant to such a degree as to impair his or her status relative to credit for the course, the instructor can drop the student from the class with a grade of W before the course-drop deadline or with a grade of F after the course-drop deadline. I will not drop you from the course. However, if you feel that you are unable to complete the course successfully, please let me know and then contact the [Registrar's Office](#) to initiate the drop process. If you do not, you are at risk of receiving an "F" for the course.

Netiquette

As we know, sometimes communication online can be challenging. It's possible to miscommunicate what we mean or to misunderstand what our classmates mean given the lack of body language and immediate feedback. Therefore, please keep these netiquette (network etiquette) guidelines in mind. Failure to observe them may result in disciplinary action.

- Always consider audience. This is a college-level course; therefore, all communication should reflect polite consideration of other's ideas.
- Respect and courtesy must be provided to classmates and to the instructor at all times. No harassment or inappropriate postings will be tolerated.
- When reacting to someone else's message, address the ideas, not the person. Post only what anyone would comfortably state in a face-to-face situation.
- Blackboard is not a public internet venue; all postings to it should be considered private and confidential. Whatever is posted on in these online spaces is intended for classmates and professor only. Please do not copy documents and paste them to a publicly accessible website, blog, or other space.

Test Proctoring Software

Two Exams (the midterm and final exams) will make use of Respondus Lock Down Browser and Respondus Monitor inside of Blackboard to promote academic integrity. You are encouraged to learn more about how to use these programs prior to the first test.

Please review the following guidelines:

- The assessments will only be available at the times identified on the course calendar.
- You may take the test at any time during the 24-hour window.
- A reliable Internet connection is essential to completing the exam. If you must go to a location to take the exam (such as the library), be sure to follow their health and safety requirements.
- You have only 1 attempt to take the test. Once the window closes, your answers will be saved, and no changes can be made.

- Respondus Lockdown Browser will require that all internet tabs are closed prior to the start of the test.
- Respondus Monitor requires a webcam and microphone.
- You will be required to show the webcam your student ID prior to the start of the test.
- Your face should be completely visible during the test. Blocking the camera will disable the test.
- Respondus Monitor requires you to take a video of your surrounding area (desk, chair, walls, etc.)
- You should not have conversations with other people and/or leave and return to the area during the test.

Center for Accommodations and Support Services:

If you have a disability and need classroom accommodations, please contact The Center for Accommodations and Support Services (CASS) at 747-5148, or by email to cass@utep.edu, or visit their office located in UTEP Union East, Room 106. For additional information, please visit the CASS website at www.sa.utep.edu/cass. Schedule an appointment with the professor(s) during the first week of classes to clarify any accommodation needs and resolve all questions pertaining to course assignments and the classroom environment. Students should present a Faculty Accommodation Letter for Student Disability Services when they meet with instructors. Accommodations are not retroactive and new Faculty Accommodation Letters must be presented each semester.

Academic Integrity:

Academic dishonesty is prohibited and is considered a violation of the UTEP Handbook of Operating Procedures. It includes, but is not limited to, cheating, plagiarism, and collusion. Cheating may involve copying from or providing information to another student, possessing unauthorized materials during a test, or falsifying research data on laboratory reports. Plagiarism occurs when someone intentionally or knowingly represents the words or ideas of another as ones' own. Collusion involves collaborating with another person to commit any academically dishonest act. Any act of academic dishonesty attempted by a UTEP student is unacceptable and will not be tolerated. All suspected violations of academic integrity at The University of Texas at El Paso must be reported to the [Office of Student Conduct and Conflict Resolution \(OSCCR\)](#) for possible disciplinary action. To learn more, please visit [HOOP: Student Conduct and Discipline](#).

Plagiarism Detecting Software

Some of your course work and assessments may submitted to SafeAssign, a plagiarism detecting software. SafeAssign is used review assignment submissions for originality and will help you learn how to properly attribute sources rather than paraphrase.

Copyright Statement for Course Materials

All materials used in this course are protected by copyright law. The course materials are only for the use of students currently enrolled in this course and only for the purpose of this course. They may not be further disseminated.

COVID-19 Precautions

You must STAY AT HOME and REPORT if you (1) have been diagnosed with COVID-19, (2) are experiencing COVID-19 symptoms, or (3) have had recent contact with a person who has received a

positive coronavirus test. Reports should be made at screening.utep.edu. If you know of anyone who should report any of these three criteria, you should encourage them to report. If the individual cannot report, you can report on their behalf by sending an email to COVIDaction@utep.edu.

For each day that you attend campus—for any reason—you must complete the questions on the UTEP screening website (screening.utep.edu) prior to arriving on campus. The website will verify if you are permitted to come to campus. Under no circumstances should anyone come to class when feeling ill or exhibiting any of the known COVID-19 symptoms. If you are feeling unwell, please let me know as soon as possible, and alternative instruction will be provided. Students are advised to minimize the number of encounters with others to avoid infection.

Wear face coverings when in common areas of campus or when others are present. You must wear a face covering over your nose and mouth at all times in this class. If you choose not to wear a face covering, you may not enter the classroom. If you remove your face covering, you will be asked to put it on or leave the classroom. Students who refuse to wear a face covering and follow preventive COVID-19 guidelines will be dismissed from the class and will be subject to disciplinary action according to Section 1.2.3 *Health and Safety* and Section 1.2.2.5 *Disruptions* in the UTEP Handbook of Operating Procedures.

Civility Statement:

Please be respectful of all students' right to learn without disruptions. In line with this statement please make an active effort to keep the talking to a minimum during lectures and presentations. Also make an active effort to either turn cell phones off or turn them to vibrate mode prior to the start of class. Appointments with instructor should be made in advance.

Course Outline (Tentative)

Date	Title
8/23/2021	Course Introduction
8/25/2021	Introduction to Simulation
8/30/2021	Queueing Theory
9/1/2021	Introduction to Simio
9/6/2021	Labor Day No class
9/8/2021	Random Numbers and Monte carlo
9/13/2021	Discrete Event Simulation
9/15/2021	First Simio Model
9/22/2021	Simio Experiments and Results
9/27/2021	Simio Framework
9/29/2021	Simio Input and output
10/4/2021	Arrivals, routing and Sequencing
10/6/2021	Simio Process
10/11/2021	Midterm exam review
10/13/2021	Midterm exam
10/18/2021	Debugging Tools and Techniques
10/20/2021	Debugging Tools and Techniques
10/25/2021	Input Data Analysis
10/27/2021	Input Data Analysis
11/1/2021	Output Data Analysis
11/3/2021	Output Data Analysis
11/8/2021	Simulation Optimization
11/10/2021	Simulation Optimization
11/15/2021	Task Sequences
11/17/2021	Advanced Topics
11/22/2021	Final Project Presentations
11/24/2021	Final Project Presentations

PS: I reserve the right to change the course outline based on the course progress.