**IE 5322-001 – Simulation & Optimization**

Summer 2016

**Instructor:** Dr. Brian Huff

**Office Number:** My Lab. Room 416 Woolf Hall

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**Office Hours (Summer 2016):** Tuesday/Thursday, 12:00 pm to 1:00 pm

 Other times by appointment

**Section Information:**

* IE 5322 Section 001, 002 (Distance), and 003.

**Time and Place of Class Meetings:** Engineering Laboratory Building (ELB), Room 256, Monday, Tuesday, Wednesday, Thursday, 1:00 to 3:00 pm. (Section 001) and 3:30 to 5:30 pm (Section 003)

**Description of Course Content:** The design and analysis of complex manufacturing and service systems using computer-based discrete event simulation techniques. Topics include an introduction to simulation methods, and the design, construction and analysis of discrete-event simulation models, as well as their computer applications. The course also covers the execution and management of simulation projects and the formal presentation of their findings.

**Student Learning Outcomes:**

* The students will be able to manually replicate the execution of a Discrete-Event Simulation Engine.
* The students will be able to summarize the various tasks outlined in a Simulation Project Methodology.
* The students will be able to recall and discuss issues associated with establishing a discrete-event simulation capability within a company.
* The student will be able to design a computer-based discrete-event simulation model to represent a complex industrial/business/service system.
* The students will be able to analyze the output of a simulation model in order to verify the appropriateness of the model’s performance.
* The students will be able to evaluate various system configurations to determine the most appropriate system design and/or justify proposed changes to a given system.

**Requirements:**

* IE 5317 or equivalent

**Recommended materials:** Simulaiton Made Easy: A Manager’s Guide, Industrial Engineering and Management Press, 1995., *Learning WITNESS*, Lanner Group, Inc., 1998.

Simulation software will be provided on classroom computers for students usage. However, it is recommended that students also obtain software packages (instructions will be provided) for installation on their laptops.

**Mailbox:** IMSE Department P.O. Box 19017

**GTA:** Zahra Banakar

**GTA Office Hours:** TBD

**Descriptions of major assignments and examinations:** There are two exams, a comprehensive final exam, homework assignments, class participation, and a simulation project which will be due at the end of the semester. The Final Exam is comprehensive.

**Prerequisites**: IE 5317 (Concurrent), or equivalent.

**Attendance:** Class attendance is not required but it is strongly encouraged. Student’s class participation can contribute to as much as 5% of the total class grade. At the University of Texas at Arlington, taking attendance is not required.

**Homework:** Students are required to master the materials presented in class. To ensure students are paying attention to the lectures and mastering material, the instructor will announce a short homework assignment and due date during lecture class.

Homework should be submitted via Blackboard by 5:00 PM on the due date. *All homework submitted after the due date and time will not be given credit.* The percentage of homework will be scaled to 10% and added to your total class score. Homework may only be graded if it can help a student’s overall class grade.

**Grading Policy**:

* Test 1 (25% of class grade)
* Final Exam (35% of the class grade)
* Simulation Project (30% of the class grade)
* Homework and Class Participation (10% of the Class Grade)
	+ 100 to 90% - A
	+ 89.9 to 80% - B
	+ 79.9 to 70% - C
	+ 69.9 to 60% - D
	+ Below 60% - F

*There is no other course credit available, and students frequently regret not submitting all homework.*

*Students are expected to keep track of their performance throughout the semester and seek guidance from available sources (including the instructor) if their performance drops below satisfactory levels.*

**Expectations for Out-of-Class Study**: Beyond the time required to attend each class meeting, students enrolled in this course should expect to spend at least an additional 9 hours per week of their own time in course-related activities, including reading required materials, completing assignments, preparing for exams, etc.

**Make-up Exams**: Makeup tests will only be given for documented illnesses or emergencies. If you cannot attend a test for any reason, you should make every effort to contact Dr. Huff beforehand.

**Grade Grievances**: Any appeal of a grade in this course must follow the procedures and deadlines for grade-related grievances as published in the current University Catalog. <http://catalog.uta.edu/academicregulations/grades/#graduatetext>.

**Drop Policy:** Students may drop or swap (adding and dropping a class concurrently) classes through self-service in MyMav from the beginning of the registration period through the late registration period. After the late registration period, students must see their academic advisor to drop a class or withdraw. Undeclared students must see an advisor in the University Advising Center. Drops can continue through a point two-thirds of the way through the term or session. It is the student's responsibility to officially withdraw if they do not plan to attend after registering. **Students will not be automatically dropped for non-attendance**. Repayment of certain types of financial aid administered through the University may be required as the result of dropping classes or withdrawing. For more information, contact the Office of Financial Aid and Scholarships (<http://wweb.uta.edu/aao/fao/>).

**Americans with Disabilities Act:** The University of Texas at Arlington is on record as being committed to both the spirit and letter of all federal equal opportunity legislation, including the *Americans with Disabilities Act (ADA)*. All instructors at UT Arlington are required by law to provide "reasonable accommodations" to students with disabilities, so as not to discriminate on the basis of that disability. Any student requiring an accommodation for this course must provide the instructor with official documentation in the form of a letter certified by the staff in the Office for Students with Disabilities, University Hall 102. Only those students who have officially documented a need for an accommodation will have their request honored. Information regarding diagnostic criteria and policies for obtaining disability-based academic accommodations can be found at [www.uta.edu/disability](http://www.uta.edu/disability) or by calling the Office for Students with Disabilities at (817) 272-3364.

**Title IX:** The University of Texas at Arlington is committed to upholding U.S. Federal Law “Title IX” such that no member of the UT Arlington community shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or activity. For more information, visit [www.uta.edu/titleIX](http://www.uta.edu/titleIX).

**Academic Integrity:** All students enrolled in this course are expected to adhere to the UT Arlington Honor Code:

*I pledge, on my honor, to uphold UT Arlington’s tradition of academic integrity, a tradition that values hard work and honest effort in the pursuit of academic excellence.*

*I promise that I will submit only work that I personally create or contribute to group collaborations, and I will appropriately reference any work from other sources. I will follow the highest standards of integrity and uphold the spirit of the Honor Code.*

Instructors may employ the Honor Code as they see fit in their courses, including (but not limited to) having students acknowledge the honor code as part of an examination or requiring students to incorporate the honor code into any work submitted. Per UT System *Regents’ Rule* 50101, §2.2, suspected violations of university’s standards for academic integrity (including the Honor Code) will be referred to the Office of Student Conduct. Violators will be disciplined in accordance with University policy, which may result in the student’s suspension or expulsion from the University. For more on academic integrity, see <http://www.uta.edu/engineering/current-students/academic-honesty.php>.

**Student Support Services**:UT Arlington provides a variety of resources and programs designed to help students develop academic skills, deal with personal situations, and better understand concepts and information related to their courses. Resources include tutoring, major-based learning centers, developmental education, advising and mentoring, personal counseling, and federally funded programs. For individualized referrals, students may visit the reception desk at University College (Ransom Hall), call the Maverick Resource Hotline at 817-272-6107, send a message to resources@uta.edu, or view the information at [www.uta.edu/resources](http://www.uta.edu/resources).

**Electronic Communication:** UT Arlington has adopted MavMail as its official means to communicate with students about important deadlines and events, as well as to transact university-related business regarding financial aid, tuition, grades, graduation, etc. All students are assigned a MavMail account and are responsible for checking the inbox regularly. There is no additional charge to students for using this account, which remains active even after graduation. Information about activating and using MavMail is available at <http://www.uta.edu/oit/cs/email/mavmail.php>.

**Student Feedback Survey:** At the end of each term, students enrolled in classes categorized as lecture, seminar, or laboratory shall be directed to complete a Student Feedback Survey (SFS). Instructions on how to access the SFS for this course will be sent directly to each student through MavMail approximately 10 days before the end of the term. Each student’s feedback enters the SFS database anonymously and is aggregated with that of other students enrolled in the course. UT Arlington’s effort to solicit, gather, tabulate, and publish student feedback is required by state law; students are strongly urged to participate. For more information, visit <http://www.uta.edu/sfs>.

**Emergency Exit Procedures:** Should we experience an emergency event that requires us to vacate the building, students should exit the room and move toward the nearest exit, which is located by turning right out of the class room, walking straight down the main corridor, turning left, and walking down two flights of stairs. When exiting the building during an emergency, one should never take an elevator but should use the stairwells. Faculty members and instructional staff will assist students in selecting the safest route for evacuation and will make arrangements to assist handicapped individuals.

**Website:** Blackboard (http://elearn.uta.edu)

**Blackboard Help:** Richard Zercher; Email: zercher@uta.edu

**Echo 360 Help:** For problems viewing ClassRev (Echo360) recordings contact classroomsupport@uta.edu.

**Distance Student Test Policies:** Exams must be taken with 24 hours of the regularly scheduled exam. Students who live within 50 miles of campus must come to campus to take all exams. Students should make every effort to take exams on-campus during the regularly scheduled time. If this is not possible, alternate exam times may be scheduled. Students living more than 50 miles from campus may take the exam with an approved proctor. Students will be responsible for identifying a proctor. Proctors must be approved by the faculty at least two weeks before the first exam. Distance testing must follow all the College of Engineering guidelines, located at <http://www.uta.edu/engineering/future-students/engineering-online/proctor-information.php>.

**Distance Student Contact and Assignment Policies:** Distance students are required to communicate with the faculty before the second class period. Distance students are expected to complete all of the regular requirements for a class. This includes submission of homework by the same due date and time as those of the in-class students via Blackboard.

Class Schedule

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| Week | Date | Topics | Student Readings & Homework Problems |
| 1 | July 12 | Introduction to Discrete Event Simulation, Demonstration of Witness  | Reading: Class Slides, Review Lecture, Class Project DescriptionRequest Software from Lanner |
|  | July 13 | The Simulation Project Methodologyand Exercises from Chapter 2 in the Learning Witness Manual | Reading: Chapter 2 – Learning Witness ManalProblems: Chapter 2 Exercises – 1,2,3,4 |
|  | July 14 | Class Project Discussion, and Exercises from Chapter 2 in the Learning Witness Manual | Reading: Chapter 2 – Learning Witness Manal**Homework Due (July 18)** – Project Report Drafts of Sections 1, 2, 3, Process Flow Chart, Excel “Analytical” Model of Problem |
| 2 | July 18 | Complete Exercises from Chapter 2 in the Learning Witness ManualDiscuss Modeling of Stochastic Distributions in Witness  | Reading: Chapter 3 – Learning Witness Manal (Distributions and Stochastic Functions)Problems: Chapter 2 Exercises – 5, 6, and 7**Homework Due (July 21)** – Learning Witness Chapter 2 Exercises 1 – 7. |
|  | July 19 | Exercises from Chapter 3 in the Learning Witness Manual | Reading: Chapter 3 – Learning Witness Manal (Multi-Activity Machines, Actions, Attributes) Problems: Chapter 3 Exercises – 1, 2, and 3 |
|  | July 20 | Exercises from Chapter 3 in the Learning Witness Manual and Test Review. | Reading: Chapter 3 – Learning Witness Manal (Variables, Machine / Resource Attributes) Prepare for Test 1. |
|  | July 21 | Test 1, and time to work on project and Witness Exercises | **Homework Due (July 25)** – Project Report Drafts of Sections 4 5, and 6. |
| 3 | July 25 | Exercises from Chapter 3 in the Learning Witness Manual | Reading: Kinds of Simulation and Basics of Queuing TheoryProblems: Chapter 3 Exercises – 4, 5, and 7 |
|  | July 26 | Exercises from Chapter 3 in the Learning Witness Manual | Reading: : Chapter 3 – Learning Witness Manal (Problems: Chapter 3 Exercises – 8, and 9 |
|  | July 27 | Exercises from Chapter 3 in the Learning Witness Manual | Problems: Chapter 3 Exercises – 10, and 11**Homework Due (Aug 03)** – Learning Witness Chapter 3 Exercises 1 – 5, 7 - 11. |
|  | July 28 | Simulation Project Discussion | Task: Construct Project Base Model |
| 4 | Aug 01 | Building a Simulation Capability | Task: Construct Project Base Model |
|  | Aug 02 | Simulation Project Discussion | Task: Verify and Validate Base Model |
|  | Aug 03 | Simulation Output Analysis | **Homework Due (Aug. 08)** – Project Report Drafts of Sections 7 and 8. |
|  | Aug 04 | Simulation Output Analysis | Task: Start Project Model Experimentation |
| 5 | Aug 08 | Simulation Class Project Discussion | Task: Project Model Experimentation |
|  | Aug 09 | Discrete-Event Execution Engine | Task: Writeup Project Report Sections 9, 10, 11 and 12 |
|  | Aug 10 | Discrete-Event Execution Engine | Task: Finalize Simulation Project Report |
|  | Aug 11 | Review 2 | **Simulation Project Due** |
| 6 | Aug 15 | Class Final Exam |  |

*The instructor for this course reserves the right to adjust this schedule in any way that serves the educational needs of the students enrolled in this course.*