Simulation in Business and Management

Course Syllabus ISOM 4720 (**Undergraduate Level**)
2024 Fall
(Subject to change)

Instructor:

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Required text & Recommended book:

Text Book(s)

Simulation with ARENA, by Kelton, Sadowski and Swets, 6th Edition

ISBN: 978-0073401317/ 0073401315, Publisher: McGraw-Hill Education

Reference Book(s)

Spreadsheet Modeling and Applications, by Albright and Winston

Course-related Technology:

Canvas (Course website)
iPRS (Mobile-based Clicker)
IPeer (Peer evaluation)

Assessment Methods:

In-class exercise	20%
Quiz (Midterm)	15%
Homework	10%
Final	25%
Midterm Project	12%
Final Project	18%
Total	**100%**

Course Content Descriptions:

This course introduces basic approaches and popular software packages for computer simulation. We will discuss discrete event simulation (for dynamic systems) with ARENA, a popular simulation package. We focus on the application of simulation in supporting decision making for marketing, finance, and operations of service and manufacturing systems. The course will emphasize critical thinking rather than memorization.

In-class exercises

We will conduct in-class exercises/ assignments using computer software. They take place multiple times and each group works together and the grading is done on a group basis. However, each student must submit an individual report/answer sheet. Students in a group will be required to sit together in the classroom. Absence results in zero point for the individual student's grade. Other team members, who show up in class, will get the group grade based on their performance.

Homework

Homework assignments will be announced as the classes go along. Each group submits one report, and it shall include ARENA models that work. On each due date, the homework assignment should be submitted online via Canvas. No late submission is accepted either by the instructor or the TA.

Quiz & Final Exam

There will be 1 quiz/ midterm and a final exam (**OEPN BOOK, OPEN NOTES**). The exams will be conducted in a computer lab and each student will have to work individually on simulation software. For the midterm, students with an approved medical certificate may skip it and will take the final exam instead. No make-up exam for the final will be administered for any reason. The time commitment for participating in the exams is essential. Suspected violations of the Code of Student Conduct will be reported to the Office of Student Conduct (or the equivalent authority).

The final exam is cumulative.

Project:

The project will be an opportunity for you to learn more about the applications of **simulation techniques** and put into practice what you have learned in class. Projects should study a specific operations management practice in a real organization. You are free to choose a topic and an organization of your interest. Your job is to identify and exploit opportunities for operations improvement in your chosen example.

As broad guidelines for these projects, put yourself in the shoe of a team of analysts trying to analyze some particular issues of an organization that is related to the content of this course. Your study should hopefully culminate with an assessment of the strengths and weaknesses of the associated operations management practice and some suggestions for improvements. This could roughly follow the following outline:

a. Understand and describe application setting: industry overview, customer characteristics, operations issues, etc.
b. Describe the current operations management practice.
c. Assess the strengths and weaknesses of the current practice, possibly with an assessment of the magnitude of benefits (harms) brought by the strengths (weaknesses).
d. Propose some improvement opportunities, with as assessment of the difficulty to implement such improvements

You will need to use **REAL DATA** for the majority of parameters/ key inputs of your project. Note that to set up the simulation environment you necessarily need some inputs to make your simulations sensible. You should explain how critical parameters used in your simulation model fit well in reality. You should also explain how the **improvement** will be implemented and preferably provide an estimate on the expected magnitude of improvement (justified based on initial data). Basically, you can consider this as a proposal to a company from either a consulting firm or an internal consulting department. Lack of real data or any proposed improvement will result in substantial deduction of your project scores.

Project (continued):

A one-page proposal is due first. There are two parts, and the formats of them are the same. Ideally, the two parts should study the same institution, but we keep the flexibility of allowing you to change the institution with appropriate reasons. The central issues can be the same, but we expect to see more detailed operations you put in your ARENA model in the second part. This arrangement hopefully showcases the progress you have made through the course.

Each group will make a presentation with the **presentation slides**. The presentation slides are prepared for a **12-minute** (targeted) presentation. It should remind the audience some broad overview of the organization you intend to study, and it should focus on the **dynamic simulation** (namely, **discrete event approach using Arena**) and your proposed solutions.

For the first part, soft copies of these materials should be uploaded to the course website before 11:59pm midnight of **10/08**. For the second, soft copies of these materials should be uploaded to the course website before 11:59pm midnight of **11/17**. You should also **submit your simulation programs** before the deadline ("source codes" ARENA models). In each part, failure to meet the deadline results in 1 point reduction of your final score. We reserve the right to adjust the grade if after reasonable attempts, we are unable to successfully run your simulation programs. Therefore, it is in your best interest to make your programs as assessable and comprehensive to us as possible. No excuse is accepted.

The evaluation will be done by the entire class as well as the instructor. 30% of your project scores come from peer evaluation, and the remaining 70% comes from the judgement of the instructor & TA. No detailed written report is needed. Also, we will not make the presentation slides available to the entire class to ensure fairness. Note: You are not allowed to use previous projects from other courses to fulfill the requirement.

Project (continued):

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Problem identification	Well defined and explained; a large amount of original thought; problem with	Well defined and explained; some original thought; problem with	Interesting problem identified, but there is little evidence of original thinking, or	It is not clear what the real problem is
Model and Data	Appropriate and rigorous model but yet not overly complicated; Excellent plan for data collection	Appropriate and rigorous model, but some fine-tuning is required; Some good ideas of how data can be collected	Appropriate model, but major adjustment is required; Little idea of how data can be collected	Inappropriate model, and/or major errors in the model; No idea on how data can be collected
Implementation Planning	Concrete and comprehensive plans; show considerations for all key issues; specific on how to measure the benefit	Good and realistic plan for data collection and improvement implementation	There are some good points in the plan, but the plan is either too vague or some ideas are unrealistic	No or little clue about what data is needed and how the improvement should be implemented; Or plans are unrealistic and illogical
Delivery	Excellent use of visuals; very clear and concise flow of ideas; demonstrate and stimulate passion	Good use of visuals; clear flow of ideas; demonstrate interest	Limited and/or not so good use of visuals; ideas presented but focus is lost at times; limited evidence of interest	No use of visuals; hard to follow ideas; lack of enthusiasm and interest
Response to questions/comments	Excellent response; demonstrate in-depth consideration of all issues	Good response; demonstrate in-depth considerations of most issues	Satisfactory response; demonstrate considerations of some of the issues	Limited response; demonstrate a lack of considerations of significant issues

Team Members Peer Evaluation

You will assess all team members for the group assignments using the following rubric. For each category, evaluate each team member and give a grade. All responses are confidential. You must submit it via IPeer by the deadlines. Failure to do so for each group assignment will reduce your own total score by 1 point. The instructor and the TA retain the right to adjust individual grade of the homework assignments and the final project based on these peer evaluations.

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Attendance	Attend almost all meetings and all classes; inform and/or seek agreement of the team before absence	Attend most of the meetings and classes; inform and/or seek agreement of the team before absence	Attend at least half of the meetings and classes; inform and/or seek agreement of team before most absences	Frequently miss meetings or classes; Or fail to inform the team before absence
Contribution	Contributes a lot of effort; routinely provides useful ideas in team meetings and class discussions	Tries hard to contribute; usually provides useful ideas in team meetings and class discussions	Does what is required; sometimes provides useful ideas in team meetings and class discussions	May refuse to participate; rarely provides useful ideas in team meetings and class discussions
Quality of work	Provides work of highest quality that impresses other team members	Provides work of high quality that meets expectations of other team members	Provides work that occasionally needs to be redone by other team members to ensure quality	Provides work that usually needs to be redone by other team members to ensure quality
Working with others	Always listens and show support to other team members; always help to keep the team work well together	Usually listens to and show supports to others; may talk too much, but does not	Rarely listens, but still shows support to other team members; sometimes not a good team member	Never show support to other team members; often not a good team member
Time management	Always does the assigned work without having to be reminded; no need to adjust deadlines or work responsibilities because of him/her	Usually does the assigned work; rarely needs reminding; no need to adjust deadlines or work	Often needs reminding; occasionally adjust deadlines or work responsibilities	Rarely get things done by deadlines; always have to adjust deadlines or work responsibilities

Course Objectives / Learning Goals:

This course aims to provide you with a fundamental overview of the operations function in business. You will develop a conceptual understanding of the various issues, problems and realities arising in different aspects of operations. Emphasis will be put on critical analysis of real operations problems encountered in business, as well as communication skills that will help you share your thoughts and analysis effectively with peers, colleagues and clients.

Course Learning Outcomes

The course learning goals comply with the educational objectives of the BBA-OM program. Upon completion of the course, you will be able to:

- Illustrate the basic operations management concepts and the role of operations management in firms (PILO 1, 3, 4)

- Explain the key operations processes and operations and their inter-relationships (PILO 2)

- Examine various problems faced by operations managers on functional, business and company- wide basis (PILO 1, 3, 4, 8)

- Evaluate critically the applicability of various operations strategies on different situations (PILO 1, 3, 4, 7)

- Communicate your ideas effectively through discussions, presentations and written documents (PILO 2, 5)

Tentative schedule:

This outline may be modified from time to time, depending on timing and interests.

Session	Date	Topics	Assignment
1	09/02 Mon	Introduction & syllabus	
2	09/04 Wed	Chap 2 Simulation with ARENA	
3	09/09 Mon	Chap 3 A Guided Tour Through Arena Additional: Pr 3-6, Pr 3-9	
4	09/11 Wed	Chap 3 A Guided Tour Through Arena Additional: Pr 3-6, Pr 3-9	09/14 Add/Drop ends
5	09/16 Mon	In-class computer assignment 1 – ARENA Universal Studio	
6	09/18 Wed	Holiday	
7	09/23 Mon	Ch 4 Part I Modeling Basic Operations [Assign. Rework. Frequency]	
8	09/25 Wed	In-class computer assignment 2 – ARENA Museum	HW 1 distributed
9	09/30 Mon	Ch 4 Part 2 Modeling Basic Operations [Schedule. Station]	
10	10/02 Wed	In-class computer assignment 3 – ARENA Staffing for Hungry Fast Food	Proposal due midnight of previous day
11	10/07 Mon	Presentation consultation/ HW (Class cancelled)	HW 1 due
12	10/09 Wed	Presentation	
13	10/14 Mon	Presentation	
14	10/16 Wed	Presentation	
15	10/21 Mon	Midterm	
16	10/23 Wed	Ch 5 Part I Modeling Detailed Operations [Submodel. NSPP. Set Resources]	
17	10/28 Mon	In-class computer assignment 4 – ARENA Fast Food Restaurants	
18	10/30 Wed	Ch 5 Part II Modeling Detailed Operations [Block. Terminating conditions]	HW 2 distributed
19	11/04 Mon	In-class computer assignment 5 – ARENA Loading Bays	
20	11/06 Wed	Ch 7 Sequence	
21	11/11 Mon	In-class computer assignment 6 – ARENA Driving Test	
22	11/13 Wed	Presentation consultation/ HW (Class cancelled)	HW 2 due
23	11/18 Mon	Presentation	

24	11/20 Wed	Presentation	
25	11/25 Mon	Presentation	
26	11/27 Wed	Conference – meeting cancelled	
27			
28			
29			