

ISE 320/420: Service Systems Engineering

Fall 2019

Syllabus

Instructor: Prof. Larry Snyder

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Class Hours: TR 1:35–2:50 PM, Mohler 453

Office Hours: By appointment

Teaching Assistant: Tao Li, tal214@lehigh.edu, Mohler 362 (office hours held in Mohler 355), Office Hours MF 1:00–2:30 PM, and by appointment

Course Description: Service industries account for about 80% of U.S. employment and GDP. This course will explore models that allow planners to reduce costs and improve customer service in a wide variety of service industries. We will discuss industries such as supply chain, health care, financial services, airlines, and retail, but many of the models we discuss are applicable to other industries as well. In fact, an important secondary focus in this course is on learning the *process* of modeling—of translating real-world problems into mathematical and OR models.

Prerequisites: ISE 230 and 240, or the consent of the instructor

Readings: The following textbook is required:

- Ravindran, A. R., P. M. Griffin, and V. V. Prabhu (2018) *Service Systems Engineering and Management*. CRC Press, New York, NY.

Another book that you might find useful is:

- Daskin, M. S. (2010) *Service Science*. John Wiley, New York, NY.

Requirements: There will be 4–5 homework assignments, an in-class midterm exam, and an in-class final exam. Students registered for ISE 320 will be evaluated based on a separate curve from those registered for ISE 420. Students in 420 will be required to complete more (and harder) homework and exam problems than those in 320.

1. Homework assignments

You will be assigned homework every few weeks. The homework problems will be based on the readings and in-class material. They will challenge you to understand, interpret, and extend the models and solution techniques we discuss in class.

2. Mid-term and final exams

You will be given an in-class midterm exam and an in-class final exam. These exams will test your understanding of the material covered in class.

3. Class participation

You are expected to attend class regularly, come to class prepared, participate in the discussions we have in class, and ask questions when you are confused.

Your grade will be calculated as follows:

| Item | Percentage |
|----------------------|------------|
| Homework assignments | 40% |
| Mid-term exam | 20% |
| Final exam | 30% |
| Class participation | 10% |

Homework Policy: The homework assignments are likely to take you a fair amount of time, so get started on them early. *No late homework assignments will be accepted unless you clear them with me ahead of time.*

You may work on the homework assignments individually or with a partner. If you work with a partner, you and your partner may submit a single write-up, or you may submit individual write-ups.

You may discuss the homework with students other than your partner, but you must cite any people or sources that helped you on a particular problem. For example: “Smarty McPants and I worked on this problem together” or “I got help from Smarty McPants and consulted ‘Service Systems for Dummies’ when solving this problem.” If you work with a partner but submit individual write-ups, make sure you cite your partner. I also encourage you to come to me or the TA for help when you are stuck.

Remember that you are ultimately responsible for mastering the material on your own, and your performance on the exams will depend on your ability to do so. Therefore, you should make sure you fully understand all of the details of the write-up you submit, whether you submit an individual or joint write-up.

Lecture Format: Class will be primarily lecture-based but I encourage questions, discussions, and other (productive) interruptions. I will use slides provided by the textbook authors and will post them on CourseSite in advance of the lectures. I will also supplement the slides using the chalkboard, so please be prepared to take notes.

Software: We will make use of Microsoft Excel or MATLAB for number-crunching. For optimization problems, I will tend to use Excel's Solver add-in or AMPL in class, but you are welcome to use any modeling environment and solver you wish when you are working on homework problems. These include Excel's Solver, OpenSolver (opensolver.org), AMPL, GAMS, Gurobi, or Python/PuLP/Pyomo.

CourseSite: I will use CourseSite to post slides, lecture notes, homework assignments and their solutions, and other information about the course. Please check there regularly for updates.

Plagiarism Policy: Plagiarism is defined in the Lehigh student handbook as “the unacknowledged appropriation of another’s work, words, or ideas in any themes, outlines, papers, reports, or computer programs.” This includes “patchwork plagiarism,” in which an author essentially quotes another author’s work when attempting to paraphrase it. There will be a zero-tolerance approach to plagiarism in this class—plagiarized work will receive a grade of 0. For more information about what plagiarism is and what counts as plagiarism, see <https://libraryguides.lehigh.edu/plagiarism>.

Accommodations for Students with Disabilities: If you have a disability for which you are or may be requesting accommodations, please contact both me and the Office of Academic Support Services, University Center 212 (610-758-4152) as early as possible in the semester. You must have documentation from the Academic Support Services office before accommodations can be granted.

Use of Mobile Devices: The use of cell phones, tablets, laptops, and other electronic devices is prohibited in class. I understand that there may be some legitimate reasons to use such devices in class, but please wait until after class ends to perform these functions. Screens are a distraction both to the students and to the instructor and may not be used.

Tentative Schedule: The following is a **very tentative** outline of the course. I may add, subtract, or rearrange topics as the semester progresses.

| Week | Chapter | Topic | Notes |
|----------|---------|-------------------------------------|---------------------------------|
| 8/26/19 | 1 | Overview of Service Systems | |
| 9/2/19 | 3 | Design of Service Systems | |
| 9/9/19 | 3 | Design of Service Systems, cont'd | |
| 9/16/19 | 4 | Evaluation of Service Systems | |
| 9/23/19 | 5 | Supply Chain Engineering | |
| 9/30/19 | 6 | Warehousing and Distribution | |
| 10/7/19 | 7 | Financial Engineering | |
| 10/14/19 | — | — | Tue: Pacing Break; Thu: Midterm |
| 10/21/19 | 7 | Financial Engineering, cont'd | Tue: No class |
| 10/28/19 | 8 | Revenue Management | |
| 11/4/19 | 9 | Retail Engineering | |
| 11/11/19 | 10 | Healthcare Delivery Systems | |
| 11/18/19 | 10 | Healthcare Delivery Systems, cont'd | |
| 11/25/19 | 11 | Financial Services | Thu: Thanksgiving |
| 12/2/19 | 11 | Financial Services, cont'd | |