DRAFT Syllabus Q4 2023

OIDD 6420
Analytics for Services: Capacity Management

Students enrolling in OIDD 6420 in Q4 2023 must attend the first class session and take the in-class final quiz on Tuesday April 25th 10:15-11:45am.

Class Schedule and Room
TR 10:15-11:45am, ROOM TBA

Instructor	**Teaching Assistant**
Noah Gans	TBA
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Course Overview

While operational excellence is critical for success in most industries today, in a wide range of service industries this is particularly true. For example, intensified competition in the banking, health care, and communications industries has led to pressure on their operations.

Elements common to many service operations make their management complex, however. In particular, service capacity is not storable or transportable, and its usage can often be highly variable.

At the same time, the rapid evolution of information technology has allowed firms to operate in a fashion – and to offer a level of service – that had not been previously possible. The electronic capture of customer and transaction information has enabled the use of a wide variety of analytical models that allow for better matching of supply to demand.

This course covers a range of analytics tools that are useful for capacity management in services, and it will provide you with insights into the economics of a range of services businesses. During the course, we'll cover the following topics.

- High-level planning models that account for multiple dimensions of service capacity.

- Low-level models of system congestion that capture the relationship between capacity choices, quality of service and, in some cases, system revenue.

- Statistical estimation and forecasting models to characterize key measures of future supply and demand.

In class, we will apply these tools and ideas to examples of service operations in health care, financial, travel, rental, restaurant, government, and information-based services.

Prerequisites

Students who have already taken OIDD 6110, OIDD 6120, and STAT 6130 should be well equipped for the class. Other students should have a solid understanding of elementary probability, statistics, and linear programming.

- Your background in probability and statistics should include an understanding of random variables, measures of central tendency and variation, sample statistics, and regression.

- Your background in linear programming should include an understanding of the algebraic formulation and spreadsheet implementation of linear programs (LPs).

For questions regarding the specifics of your background, please contact me.

Course Materials

All course materials are either downloadable from study.net

STUDY.NET LINK HERE

and Canvas

CANVAS LINK HERE

or will be distributed in class.

There is no required textbook. For those who would like to have reference texts, I recommend the following books:

- J. A. Fitzsimmons and M. J. Fitzsimmons (2008). *Service Management: Operations, Strategy, and Information Technology*, Irwin-McGraw Hill, 6th ed.
- R. W. Hall (1991). *Queueing Methods for Services and Manufacturing*, Prentice Hall.

Course Requirements and Grading

Course grades will be based on class participation (15%), short homework questions (25%), case write-ups (30%), and a final quiz (30%).

Class Participation

On-time attendance is mandatory, and 10 of the 15 class participation points will reflect this basic measure of participation. Each student gets one "free" absence that does not affect their attendance score, but each additional absence is scored more negatively:

< 2 absences	10/10 attendance points
2 absences	9/10 attendance points
3 absences	7/10 attendance points
4 absences	3/10 attendance points
> 4 absences	fail the course

The last 5 of the 15 class participation points reflect my qualitative judgment concerning your effective contribution to class discussions and dynamics. You should be attentive to the class discussion. Your comments should respond to and "push forward" what is happening in class.

Policy on Electronics in the Classroom

The course is structured for lecture and discussion, and it moves more quickly (and covers more material) than a "flipped" classroom in which students work on spreadsheets during class. To that end, unless I approve a student request to use a tablet or laptop in response to a specific extenuating circumstance, these devices are not to be used in class. Phones should not be used in class. **Unauthorized use** of electronics in class will be **marked as an absence** for that day. Please see the section on Class Participation, above.

Short Homework Exercises

There will be five relatively short homework exercises that, in some cases, prepare you for an upcoming class and, in others, review material we've just covered. You will be able to download these from Canvas / Files after class on the day the homework is assigned and should **enter your answers into a Canvas Quiz by 9am on the day the homework is due.** You may discuss the assignments with others, but your answers to the quizzes must be your own. **Late submissions will be penalized.**

Case Write-Ups

There are three longer homework exercises associated with cases we'll cover in class. I will count the best 2 scores toward your final grade.

For each case, I will post on Canvas a set of questions to be answered. You may answer the questions one at a time. While there is no need to write up the case as a memo, your answers to case questions should be crisp and complete. I will judge your answers based on the depth, clarity, and care with which you present them.

You should do these cases with a partner, and I have set up Case HW groups on Canvas where you and your Case HW partner can form a group. The first Short Homework asks you to sign up and report who your partner is. You and your partner should hand in one write-up for the two of you. **You should upload your write-up, along with any associated Excel (or other) files with analysis, to Canvas by 9am on the day the homework is due**. **Late submissions will be penalized.**

Self-Study Exercises

The course also includes ungraded self-study exercises that are designed to for you to practice using the course's analytical models to solve problems. I will post sample solutions for the exercises on Canvas.

I suggest you work in pairs on the self-study exercises. Having a partner will help to ensure that you do the work on a timely basis. You are also likely to find that discussing the problem with another person helps you in the learning process.

Final Quiz

On **Tuesday April 25th 10:15-11:45am**, an in-class, open-book quiz will cover the tools and concepts developed in class. No electronics will be allowed during the exam, but you will be able to bring your own written notes, as well as printouts of whatever is posted on Canvas and Study.Net this quarter.

Homework and self-study problems will give you a good idea of the kind of questions you can expect on the quiz. In the last week of class, I'll also hand out a sample quiz which you can also use to practice for the final quiz.

While you may prepare in groups for the quiz, the notes you use during the quiz must be your own. Similarly, the work performed on the quiz itself must be your own.

Class Schedule

Below is a summary listing of class topics and the due dates for case write-ups. To prepare for a given session, you should go to Canvas

<div align="center">CANVAS LINK HERE</div>

and follow the appropriate link for instructions for the given class.

Class	Date	Topic	Video Review	Short HW	Case HW
1	3/14	Intro: Long Term Staffing			
2	3/16	Review of Statistics, Optimization	#1	#1	
3	3/21	Multiple Types of Capacity: Shouldice			#1
4	3/22	Forecasting Demand / Customer Traffic		#2	
5	3/28	Basics of Congestion: Little's Law			
6	3/30	Economics of Congestion: Queueing		#3	
7	4/04	Hierarchical Capacity Planning: Megacard			#2
8	4/06	Queueing Models - Applications		#4	
9	4/11	Censored Demand: Abandonment, Loss			
10	4/13	Applications of Abandonment and Loss		#5	
11	4/18	Loss and Capacity/Revenue Management: KFC			#3
12	4/20	Wrap-Up: More Complex Methods			