

B6801 Operations Management

Prof. Marcelo Olivares, Fall 2011
Course At A Glance

#	Date	Topics	Readings	Assignment Due
1	10/26	Introduction		
2	10/31	Process analysis	Beleza Natural (*) Production Processes	
3	11/2	Process analysis with a product mix	National Cranberry (*) Bottleneck Analysis	
4	11/2	Evening Session (5:30 PM) Guest Lecture by Sam Palmisano (CEO IBM)		
	11/7	No class, university holiday		
5	11/9	Lean operations in the auto industry Instructions to play Littlefield	Listen to NPR documentary (*) Littlefield Labs instructions (*)	Hmwk 1
	11/11	Optional Friday Session (12:30 PM) to setup for Littlefield game		Bring laptops
	11/14	No class (replaced by evening session on 11/2)		Littlefield starts at 7PM
6	11/16	Quality management	Improving Customer Engagement (*) Statistical Process Control	
7	11/21	Process capability, 6-sigma, quality in services	Ritz Carlton Hotel (*)	Hmwk 2: Ritz Carlton (group assignment) Littlefield ends at 7PM
	11/23	No class (Thanksgiving)		
8	11/28	Managing variability and waiting time	Variability and its Impact on Process Performance	Littlefield write-up (group assignment)
9	11/30	Managing waiting time in service operations	Manzana Insurance (*)	
10	12/5	Introduction to supply chain management Newsvendor model	Betting on Uncertain Demand	
11	12/7	Speculative vs. reactive capacity	Sport Obermeyer (*)	Hmwk 3
12	12/12	Course summary		

(*): Required. Other readings are optional, but recommended.

Columbia University
Graduate School of Business
B6801 Operations Management
Fall 2011

Prof. Marcelo Olivares
Uris Hall, Room 417
212-854-3144, molivares@columbia.edu
Off. Hours: Thursday 12:30-1:30pm (and by appointment)

Teaching Assistants:

Caner Gocmen Uris Hall, Cubicle 4V fgocmen13@gsb.columbia.edu Off. hours: Tue. 3-4PM	Sang Won Kim Uris Hall, Cubicle 4H skim14@gsb.columbia.edu Off. Hours: Mon. 1-2PM	Yina Lu Uris Hall, Cubicle 4J ylu13@gsb.columbia.edu Off. Hours: Mon. 4-5PM	Serdar Simsek Uris Hall, Cubicle 4L as3497@columbia.edu Off. Hours: Thu. 4-5PM
---	---	--	--

Course Overview and Objectives

Operations Management is the design and management of the processes that transform inputs into finished goods or services. Operations is one of the primary functions of a firm. Whereas marketing focuses on the demand for the product, and whereas finance provides the capital for the product, operations actually produces and delivers the product.

This course provides a foundation for understanding the operations of a firm. Our objective by the end of the course is to provide you with the basic skills necessary to critically analyze a firm's operating performance and practices. Such knowledge is important for careers in a variety of areas, including general management, entrepreneurship, investment banking (e.g. business restructurings, mergers and acquisitions), venture capital (e.g. evaluating new business plans) and management consulting (business restructuring improvement).

Unlike many courses in the core, which tend to treat the firm as a "black box", we will be primarily concerned with "opening up" the black box and discovering what makes a firm "tick" - or, for that matter, "stop ticking". In contrast to your management courses, our focus is on the technological rather than human dimension of a firm's internal operations - though there are obvious connections between the two that we will explore. In contrast to the measurement focus of your accounting courses, our concern is to understand what elements of a firm's operations enable it to produce quality outputs at a competitive cost structure. That is, we will focus on how the "physics" of material, work and information flows and the design and management of a firm's processes interact to determine a firm's cost structure and its ability to compete effectively in terms of non-cost measures such as quality, variety and speed.

Because the operations of a firm vary widely from one industry to the next, a course like this cannot cover all topics that are relevant to any given industry. Rather, we have selected a set of topics that are fundamental to understanding operations in a wide range of industries. These concepts are then illustrated using cases from a diverse set of businesses.

Methods and Materials

The course uses a variety of teaching methods and materials. Classes will consist of lectures, discussions, and video presentations. Fundamental concepts are contained in lecture notes and readings. Analytical tools are presented in notes, discussed in lectures, and reinforced by group as well as individual assignments. Cases are also used to illustrate the context and complexity of operations issues.

Text and Readings

Assigned material should be read before class to facilitate comprehension, discussion, and coverage. Many of the readings are short, and some are optional. Most readings are contained in a customized textbook that will be distributed in the first class. Use the syllabus as a guide for readings.

Groups

You should meet with your learning groups for doing the written group assignments, in-class exercises and general class preparation.

Class Preparation

We have made a sincere effort to keep the amount of reading for each class reasonable; in turn, however, we expect you to read the required materials and be well prepared for each class. Cases, in particular, typically require a detailed reading and will often require analysis of relevant data.

Conduct

Business School classes take place in an environment that supports learning and encourages the exchange of ideas. Behavior that distracts students and the professor negatively affects the learning environment. For example,

- using electronic devices (including laptops) for purposes not authorized by the professor,
- arriving late to class or leaving early, and
- walking in and out during class

are particularly detrimental to the classroom environment. Such conduct violates the School's Code of Professional Conduct, the Learning Contract and/or the School's Electronic Device Policy and is disrespectful to classmates and instructors. Students that fail to conduct themselves properly face, at a minimum, a substantial penalization in the class participation portion of their grade.

Grading

Your grade in the course will be based on individual, as well as group efforts and performance. We will use the following weighting scheme:

Class Participation	20%
Assignments (3)	15%
Littlefield Labs Game Write-Up	15%
Final	50%

Class Participation

We will judge class participation on the extent to which you appear prepared, the relevance and depth of your comments, the degree to which you listen carefully and respond to your peers, and your willingness to take chances in order to further the educational experiences of others. Please bring your tent (name) card to class. Please notify your instructor by email in advance if you have to miss a class, or if you will be late or leaving early from class.

Homeworks

- There are three homework assignments for the course and homeworks constitute 15% of your final grade.
- Homework is due at the beginning of the session on the assignment's due date.
- Electronic submissions are not accepted.
- Each student must turn in his or her own assignment for homeworks 1 and 3 (these are type B assignments). We encourage students to attempt completing the assignments on their own. However, to promote learning, students are allowed to discuss each assignment with other students in their learning teams.
- Homework 2 is a group assignment (type A).
- The assignments contain both quantitative and qualitative questions. Credit is not given on quantitative questions unless all work is shown.

Littlefield Labs Game

During the course, we will play an experiential game, "Littlefield Labs", to get some hands-on experience on some of the concepts covered in class. The game simulates a laboratory that provides blood testing to customers, and each team will have to manage several aspects of the lab (input materials, capacity at several stages of the process, etc.) in order to maximize the profit of the company. Teams (formed by learning groups) will compete during one week, playing the game online (using a web browser) outside lecture hours. The grade for this activity will be calculated based your ranking in the competition (20%) and a write-up to be handed in at the end of the game (80%). A detailed outline for the write-up will be provided.

Exams (Open book and notes. Bring calculator but no laptops allowed.)

Final Exam: Normal 3-hour written exam.

School Policy regarding non-return of final exam papers: The construction of reliable, discriminating and valid exams is a very difficult endeavor, and returning exams precludes the use of those test questions for many years. Since the primary goal of the final exam in this course is to evaluate students' knowledge, returning exams would make it more difficult for that goal to be achieved. The final exams will be available in my office for all of the next semester.

Class by Class Summary

Class 1 (Wed., Oct. 26)

Topics:

The operations function and the process view of operations. Overview of topics.

Class Activities:

Course overview. Introduction to process analysis.

Class 2 (Mon., Oct. 31)

Topics:

Process Analysis

Prepare:

Read the CBS case “Beleza Natural” and think about the following questions for class discussion:

1. In a nutshell, what is Beleza Natural’s business strategy?
2. What are the key resources that Beleza Natural must coordinate in order to execute effectively their business model? What are the most important challenges they need to address in the short term?
3. The case mentions the idea of hiring more workers to fix some of the capacity issues.
 - a. How would hiring additional staff affect labor utilization?
 - b. Would you recommend hiring more employees? Where would you add these employees?

Recommended optional reading: “Production Processes”

Class activities:

Introduced concepts and tools for process analysis. Link operational performance metrics to business performance through the use of ROIC trees.

Class 3 (Wed., Nov. 2)

Topics:

Process Analysis with a product mix

Prepare:

Read “National Cranberry Cooperative (NCC)”.

To prepare for the discussion do the following:

1. Draw a process flow diagram showing the major process steps, inventories and flows beginning with Receiving and finishing with the Separators. Indicate the capacity at each of the process steps in *barrels per hour*. You should assume:
 - a. 16,000 barrels per day is the average of deliveries over the 20 days from 9/20-10/9.
 - b. Each truck carries 75 barrels on average
 - c. Trucks arrive uniformly over a 12-hour period
 - d. 70% of trucks carry exclusively wet berries and 30% of them carry exclusively dry berries.
 - e. During high-volume period, the destone/dechaff/dry operations starts at 7AM (rather than 11 AM as shown in Figure E).
2. Which operation (or operations) is the bottleneck?
3. How late does the plant need to be open (i.e., when does the plant shut down) during this peak season?
4. How bad is the truck delay at the loading dock during this peak season?
5. What are the basic options for improving the operation? Which options would you recommend and why? In justifying your recommendation, be sure to include a simple quantitative analysis (i.e., include an intelligent back of the envelope calculation).

In class, be prepared to discuss and defend your recommendations.

Recommended optional reading: “Bottleneck Analysis”.

Class Activities:

Discuss NCC.

Class 4 (Wed. Nov. 2)

Topics:

Guest Lecture in Operational Excellence
Wednesday, Nov 2, 5:30PM, Uris Hall Room 301

Class Activities:

Attendance to this lecture is required as it replaces the regular class on Monday 14.

Samuel Palmisano, Chairman, President, and CEO of IBM Corporation, gives a lecture on “Creating Competitive Advantage Through Operational Excellence,” as one of the IBM Centennial Lectures.

Class 5 (Wed., Nov. 9)

Topics:

Lean operations, with applications to the automotive industry.
Instructions to play Littlefield game.

Prepare:

Read Instructions to play Littlefield Labs.
Listen to the first 30 minutes of the NPR American Life documentary about NUMMI.
<http://www.thisamericanlife.org/radio-archives/episode/403/nummi>
(the episode is also available on iTunes)

Class Activities:

Discuss the principle of lean operations, just-in-time production, and continuous improvement in the auto industry. This is part of the CBS integrated case on the auto industry.

We will also introduce the Littlefield game.

Due:

Homework 1

IMPORTANT: Littlefield game starts Monday Nov. 14 at 7pm and finishes Monday Nov. 21 at 7PM. There is an optional review session on Friday Nov. 11, 12:30PM. The objective of this session is to meet with your learning group to plan your strategy to play the game and clarify any questions regarding the game. Computing support will be provided.

Class 6 (Wed., Nov. 16)

Topics:

Quality Management and Statistical Process Control.

Prepare:

Read the case “Improving Customer Engagement” posted in Angel.

Download the spreadsheet that comes with the case and bring laptop to class.

Recommended optional reading: “Statistical Process Control”.

Class Activities:

We will discuss the following issues:

1. Definition of quality.
2. What is statistical process control, and why is it important?
3. What is special and common cause variation? Why is it important to distinguish between the two?
4. Constructing and interpreting control charts.

Class 7 (Mon., Nov. 21)

Topics:

Process capability and Six-Sigma.

Quality in services.

Prepare:

Read “The Ritz-Carlton Hotel Company: The Quest for Service Excellence”.

Do Homework 2 (group assignment) about the case.

Class Activities:

Discuss process capability and Six-Sigma. Discuss Ritz Carlton Case.

Due:

Executive Summary for Homework 2: Ritz Carlton Hotel (group assignment).

Class 8 (Mon., Nov. 28)

Topics:

Dealing with variability and response times in a make-to-order operation.

Prepare:

Recommended optional reading: “Variability and its Impact on Process Performance”.

Think about the following questions for class discussion:

1. How important is response time in the businesses you are familiar with? What are the causes of the response time problems in these businesses? How can a firm effectively manage response time?
2. What are the consequences of exactly balancing capacity and demand? Why is excess capacity needed?

Class Activities:

Discuss the impact of variability and utilization on response times. Introduce queuing models and insights for the design of service operations.

Due:

Homework: Littlefield write-up (Group assignment)

Class 9 (Wed., Nov. 30)

Topics:

Managing waiting time in service operations.

Prepare:

Read “Manzana Insurance – Fruitvale Branch”.

For Class Discussion:

Manzana Insurance is based on the operations of a real insurance company, though certain details have been simplified. Be prepared to answer the following questions in class:

1. What operational problems is Manzana facing? How might they be connected to the deteriorating profits experienced over the past year?
2. What are some possible alternatives for improving Manzana's performance? How might these specifically help to eliminate the causes of the problems facing Manzana?

You are Bill Pippin. On the memo on the first page of the case, Tom Jacobs identifies various problems facing the Fruitvale branch. He then asks for “a memo with concrete suggestions.” Write that memo and be prepared to discuss it in class.

Class Activities:

Discuss Manzana Case.

Class 10 (Mon., Dec. 5)

Topics:

Dealing with uncertainty in a make-to-stock operation: the Newsvendor model.

Prepare:

Make a forecast for the iPhone world-wide sales (in units) during the fourth calendar quarter (Oct-Dec) of 2011 (this is the first fiscal quarter of Apple for 2011). Be prepared to provide your forecast during class.

Recommended optional reading: “Betting on Uncertain Demand: The Newsvendor Model”.

Class Activities:

In this lecture we will learn the Newsvendor model to understand the implications of production pre-commitment and risk in supply chain management.

Class 11 (Wed., Dec. 7)

Topics:

Role of speculative and reactive capacity in matching supply with uncertain demand.

Prepare:

Read “Sport Obermeyer, Ltd.”. Think about the following:

1. Using the sample data given in Exhibit 10, make a recommendation for how many units of each style Wally Obermeyer should order during the initial phase of production (a spreadsheet with Exhibit 10 is posted in Angel). Assume there are no limits in the total size of the order (i.e. there is unlimited capacity), and ignore the minimum order quantity constraint in your analysis. Also, assume that there would be no future production for these parkas (i.e., only one production decision is taken to satisfy the demand). *This question is part of Homework 3.*
2. As indicated in the case, there are two production runs in Asia. The first production takes place six months before the Las Vegas show (production early), and the second one right after the show (production late). The production capacity after the show is limited and therefore some production must be done early. Discuss qualitatively the factors that Wally Obermeyer should consider in deciding which parkas to produce early and which to produce late.

Class Activities:

This session studies how one fashion apparel supplier uses forecasts and early sales information to increase its flexibility.

Due:

Homework 3.

Class 12 (Mon., Dec. 12)

Topics:

Course summary.

Prepare:

Review the concepts and tools learned in the course.

Class Activities:

This session will review some of the main concepts covered in class.