NYU STERN
NEW YORK UNIVERSITY · LEONARD N. STERN SCHOOL OF BUSINESS

Competitive Advantage from Operations

Sample Syllabus B01.2314.24

COURSE DESCRIPTION:
This course serves as an introduction to Operations Management. The coverage of the discipline is very selective: We concentrate on a small number of powerful themes that have emerged recently as the central building blocks of world-class operations. We also present a sample of operations management tools and techniques that have been proved extremely useful over the years. The topics are equally relevant in the manufacturing and service sectors.

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MEETINGS: T.B.A.

OFFICE HOURS: T.B.A.

TEACHING ASSISTANT: T.B.A.

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COURSE WEBSITE: Blackboard (http://newclasses.nyu.edu/).

CLASS MATERIAL:

Required: (Buy in bookstore)

Custom Text: A customized version with selected chapters from Operations & Supply Management; Chase, Aquilano and Jacobs; Twefth Edition; McGraw-Hill Irwin; 2009. Available in bookstore.
CASES AND READINGS: Packet (e-version) available from the bookstore webpage (also, some additional cases will be distributed in class, and some can be downloaded from the course web site)

Recommended:

The Goal: "*The Goal: A Process of Ongoing Improvement*", third revised edition (buy in bookstore), by Eliyahu Goldratt and Jeff Cox, North River Press, Inc. 2004.

Other Operations Management References (Optional):
• *Operations Management for Competitive Advantage* (Tenth Edition), by Chase, Aquilano and Jacobs, Irwin / McGraw-Hill.
• *Designing and Managing the Supply Chain: Concepts, Strategies, and Cases*, by David Simchi-Levi, Philip Kaminsky and Edith Simchi-Levi, Irwin / McGraw-Hill.

COMPUTER SOFTWARE: EXCEL

GENERAL INFORMATION

1. COMPETITIVE ADVANTAGE from OPERATIONS: (CUSTOM-TEXT in this Syllabus)
This is a required textbook. The syllabus includes specific references to chapters in this book. There is a **Custom e-book** (chapters we use) that you can purchase on the following web site:
https://ebooks.primisonline.com/cgi/showebook.cgi?isbn=0390436518
The **Full text ebook** can be purchased on the following web site:
https://ebooks.primisonline.com/cgi/showebook.cgi?isbn=0390125393

2. CASES DIGITALCOURSEPACK: Includes the following cases that we will use in this class.

- Competing on Capabilities: The New Rules of Corporate Strategy (Harvard Business Review)
- Benihana of Tokyo (HBS)
- National Cranberry Cooperative (Abridged) (HBS)
- Blanchard Importing and Distributing Company, Inc. (HBS)
- L.L. Bean, Inc. (HBS)
- Toyota Motor Manufacturing, USA Inc. (HBS)
- Zara, Fast Fashion (HBS)

Please go to https://www.bookstores.nyu.edu/ to order a copy of the Custom-Text and the Cases Digital Coursepack.

The rest of the cases and readings will be distributed in class, and some can be downloaded from the course web site. I will also post slides (and selected lecture notes) on the course website prior to each class.

3. BOOK: Eliyahu Goldratt, *The Goal*, 3rd Revised Ed., North River Press, 2004.
This is an optional reading that I strongly recommend you to start reading **before** the first weekend of class.

OTHER OPERATIONS MANAGEMENT REFERENCES (Optional):

• *Operations Management for Competitive Advantage* (Tenth Edition), by Chase, Aquilano and Jacobs, Irwin / McGraw-Hill.
• *Designing and Managing the Supply Chain: Concepts, Strategies, and Cases*, by David Simchi-Levi, Philip Kaminsky and Edith Simchi-Levi, Irwin / McGraw-Hill

GRADING COMPONENTS

• Individual Case Assignments	15%
• Group Homework	10%
• Class Participation	10%
• Midterm Exam (2)	40%
• Final Exam	25%

Please read the following descriptions very carefully (further details at the end of this syllabus)

Case Assignments and Group Homework:

- **Case Assignment**: There ware eight (8) case assignments throughout the semester. These assignments are a combination of analysis and brief explanations, and are designated as **SHORT PAPERS.** Submissions should be up to two pages in length and be submitted at the

beginning of the session in which they are due. Keep a copy for your reference during class. Show all the work if your response requires a calculation.

- **Group Homework**: There are two homework to be done in groups of maximum four students. Assignments submitted by groups of five or more students will not be accepted for credit. In the same spirit, groups should not collaborate with each other for the purpose of doing the assignments.

HONOR CODE
Please review the MBA Stern Honor Code:
http://w4.stern.nyu.edu/scorp/committee.cfm?doc_id=4797

ACADEMIC ACCOMODATION
If you have a qualified disability and will require academic accommodation during this course, please contact the Moses Center for Students with Disabilities (CSD, 212 998-4980) and provide me with a letter from them verifying your registration and outlining the accommodations they recommend. If you will need to take an exam at the CSD, you must submit a completed Exam Accommodations Form to them at least one week prior to the

Week 1: PRODUCTION PROCESSES AND PROCESS DESIGN

Readings

1. *The Goal* by E.M. Goldratt (Optional)
2. Competing on Capabilities: The New Rules of Corporate Strategy (Included in case Course-packet) by G. Stalk Jr., P. Evans and L. E. Shulman, published in Harvard Business Review, March-April 1992.
3. Read Chapters 1 & 2 in Custom-Text: "Introduction to the Field" and “Operations and Supply Strategy”.
4. Article *Implementing Restaurant Revenue Management*, available in course webpage.

Virtual Plant Tours

In this class, we will study different types of operating processes and discuss their suitability for producing various goods and services. Some of these processes and products are illustrated in about 50 virtual PLANT TOURS accessible from the website http://www.mhhe.com/omc/tours-frames.htm .

Study the following two tours and answer the questions that follow:

1. Steinway & Sons (http://www.steinway.com/factory/tour.shtml): Job shop..
2. Toyota Motor Company (http://www.toyotageorgetown.com/vtour/vtour.asp): Assembly line process.

Questions

1. Identify the key elements of each company?s business strategy.
2. Identify the key elements of each company?s operating system. The operating system is the collection of all processes that a company uses to produce/deliver the goods and services that it offers.
3. What are the differences between the operating systems of the three firms?
4. What is your assessment of the fit between each company?s business strategy and its operations strategy?

Case:

Benihana of Tokyo, W. Sasser and J. Klug, Harvard Business School (1998). Read, analyze, and be prepared to discuss the Benihana of Tokyo case. Use the following study questions as an aid in analyzing the case.

a) Describe Benihana as an operating system. (Draw a process flow diagram.) List the relevant inputs, process, and output elements in three columns.
b) How does the operating system support the Benihana concept?
c) Which parameters of the operating system influence the throughput of a Benihana Restaurant?
d) How does the cost structure of a Benihana restaurant compare with that of a typical American restaurant? How does Benihana get its competitive advantage?

CASE ASSIGNMENT #1: (Due at the Beginning of Class)

Answer questions b) and d) and submit at the beginning of class. Justify your answers.

Related Links

Benihana commercials: http://www.benihana.com/about/video http://www.benihana.com/special
A history of Benihana: http://www.benihana.com/about/

Week 2: PROCESS FLOW ANALYSIS & CAPACITY MANAGEMENT

Readings

1. Read Chapter 6: "Process Analysis" in Custom-Text.
2. Read "Analysis of an Operation" (available on course website)
3. Principles of Scientific Management by F.W. Taylor (available on course website)

Topics:

- Flow Diagram
- Capacity, Throughput Time, Cycle Time
- Gantt Chart
- Bottleneck
- Factors that Affect Throughput and the Bottleneck
  - Order Size
  - Resources (Labor, Supplies)
  - Set-up Time
- Multi Product Analysis

Cases:

1. *Kristen's Cookie Company (A)*. Available on custom-text pages 184-185. Read, analyze, and be prepared to discuss the Kristen's Cookie Company case, utilizing the six key questions at the end as guides.

CASE ASSIGNMENT #2: (Due at the Beginning of Class)

a) Draw a process flow diagram for the operating system in Kristen?s Cookie Co. Assuming that each order is a custom order for one dozen cookies. Compute the cycle time, throughput time, and capacity for each process in the system and for the entire operating system.

b) Identify ALL possible bottlenecks in the Kristen's operation. Explain how would you reduce the negative effects of these bottlenecks in the production process?

Week 3: PRODUCTION AND SERVICE PROCESSES

Readings:

1. A Framework for Analyzing Service Operations (available on course website)
2. A Framework for Analyzing the Quality of Service Interface (available on course website)

Topics:

- Types of Operating Processes
- Design of Goods and Services
- Distinctive Aspects of Service Management: Intangibility, Perishability, Heterogeneity.
- Matching Supply and Demand

Cases:

National Cranberry Cooperative (Abridged). Read, analyze, and be prepared to discuss the case in class.

SUBMIT GROUP HOMEWORK #1: (NATIONAL CRANBERRY COOPERATIVE)

1. Draw a process flow diagram for the process fruit operation of RP #1. What are the average arrival rates and processing rates per hour for wet and dry berries?
2. Should the fifth dumper have been purchased? Justify your answer.
3. NCC is considering selling two dumpers to create more space for trucks waiting to unload. In addition, NCC is considering reserving one dumper for trucks bringing dry berries and the two remaining dumpers for trucks bringing wet berries. Evaluate these alternatives.
4. Identify any bottlenecks in the process.

5. Identify the problems at NCC. How severe are these problems?
6. Develop and evaluate alternative solutions to the problems. Conduct detailed numerical analyses. To start, examine a day when 18,000 barrels arrive, of which 70% are wet. First, assume that trucks arrive evenly spaced for 11 hours and processing starts at 7:00 am.
7. Second, repeat the analysis using the actual arrival schedule given in the case for a sample day. Assume that:
    - 70% of the arrivals are wet berries
    - 10,000 barrels or more are received for 25 days in a year
    - 25 workers work overtime when needed to process berries.

Week 4: Optimal Resource Allocation

Readings

1. Read chapter 2A on the Custom-Text on Linear Programming (p. 36-55). This part of the chapter introduces linear programming and explains "Model Formulation" and the "Graphical Solution Procedure." We will discuss these topics in class.
2. Introduction to Linear Programming (available on course website)

Topics:

- Linear Programming
- Models and Applications
- Sensitivity Analysis and Shadow Prices

Case: Paradise Juice (available on course website)

Questions Attempt to answer questions (a)-(e) in Part I at the end of the case.

Additional Questions

Attempt to formulate linear programs for problems 3-6 from the chapter. (p.53-54). Notice that all three problems involve similar types of decisions. These problems are called product-mix problems. We will use these problems to illustrate the LP methodology in this class. In the subsequent classes, we will introduce other decision problems where LP is useful.

After this class, graphically solve practice problems 1-5 in the Problem Set *Practice Problems on Linear Programming* (available on the course webpage). Also formulate linear programs for the remaining problems in the Problem Set.

Week 5: Midterm I and Introduction to Queueing Models

Mid-Term Examination I

This is an in-class, open book/notes test. It will include calculations and short answers and responses. The material on the test is based primarily on class lectures and discussions.

Introduction to Simulation

Readings Read chapter 19A: "Simulation" in Custom-Text

Week 6: PROJECT MANAGEMENT & TIME-TO-MARKET

Reading

1. Read Chapter 3: "Project Management" in Custom-Text.
2. Caselets: Four Project Management Exercises (available on course website): FCN Securities (B), FCN Securities (C), Specialty Contractors, Aerospace Components.

Topics:

- Project Management: CPM & PERT
- Crashing the project

Additional Links

Movie on Project Management in the Construction of the Alton Bridge over the Mississippi. (14 mins)
http://sterntv.stern.nyu.edu:8080/ramgen/faculty/Project-Management-The-Alton-Bridge.rm

Case FCN Securities Demo (A) and Allied Distributing (available on course website)

CASE ASSIGNMENT #3: (Due at the Beginning of Class)

Draw the project network and identify ALL critical paths for both the FCN Securities Demo (A) and Allied Distributing projects.

Week 7: THE EFFECTS OF UNCERTAINTY–WAITING LINES & QUEUEING THEORY

Readings

1. Read "Queueing management and Models" available on the course website.
2. Read chapter 8A: "Waiting Line Analysis" in Custom-Text (p. 276-305)
3. Read "Managing Real and Virtual Waits in Hospitality and Service Organizations" (available on course website)

Topics:

1. Characteristics of a Waiting-Line System: Arrival, Waiting Line, Service Characteristics
2. Measuring the Queue's Performance and Queuing Costs
3. Psychology of Queues

Questions

Solve the exercise problems given in "Practice Problems on Queuing Systems."

Additional Readings:

- Katz, Larson and Larson 1991. "Prescription for the Waiting-in-Line Blues", Sloan Management Review.
- Allocating Telecommunication Resources at LLBean.

Case : FIRST CITY NATIONAL BANK (available on the course website)

CASE ASSIGNMENT #4: (Due at the Beginning of Class)

Calculate the waiting time for a customer (time in the queue before service) for each line configuration for each half hour for a super-peak day. Thus, determine which of the two line configurations you would recommend, and the number of tellers you would use to staff the system. Support your result with the appropriate quantitative queuing analysis. You do not need to submit all of the computer output. The relevant results and the answer to the question will suffice.
You may use the spreadsheet (MMS.xls) on the website to compute the performance measures for each line configuration. (Make sure that you also know how to do computations by hand, since the spreadsheet will not be provided for the exam.)

Downloads

MMS.xls: Excel spreadsheet to compute performance measures

Week 8: Total Quality Management & Six Sigma Principles

Readings

1. Read Chapter 9: "Six-Sigma Quality" in Custom-Text
2. Read Chapter 9A: "Process Capability and SPC" in Custom-Text
3. Read Chapter 12: “Lean Manufacturing” in Custom-Text

Topics

- Total Quality Management, Continuous improvement & Six Sigma
- Control Charts

Case:

- TOYOTA MOTOR MANUFACTURING, USA INC. (available on Course-Packet)

Questions

Toyota Case

1. What are the principal components of the Toyota Production System? What capabilities must an organization possess in order to implement TPS effectively?
2. How does 'quality control' work at Toyota Motor Manufacturing?
3. As Doug Friesen, what would you do to address the seat problem? What options exist? Where would you focus your attention and solution efforts? What would you recommend and why?

Case: *South Tree Electronics* case available on course website.

Case Assignment #5: (Due at the Beginning of Class)

In analyzing South Tree's quality control problem the following study questions may help:

- Indicate on the process diagram, all current inspection points and note the accumulated cost and yield of each operation and test in the process.
- How much does a good S-39 circuit cost?
- How many circuits must you start with to achieve the desired output level?
- At what yield rate would you be indifferent between continuing and discontinuing the first inspection in the process?

Related Links: WSJ article “The 'Six Sigma' Factor for Home Depot” available on course website.

Week 9: Midterm II and Introduction to Demand Forecasting

Mid-Term Examination II

This is an in-class, open book/notes test. It will include calculations and short answers and responses. The material on the test is based primarily on class lectures and discussions.

Introduction to Demand Forecasting

Reading

Read Chapter 15: "Demand Management and Forecasting" in Custom-Text to get familiar with the issues in forecasting and the differences between the techniques available for forecasting. You do not need to memorize any of the formulas.

Case: BLANCHARD IMPORTING AND DISTRIBUTING COMPANY, INC.

Questions

Use the following questions to analyze Blanchard's demand data:

1. What is the purpose of forecasting and what are the main aspects of a "good forecast"?
2. Considering the sales patterns for the Blanchard products, how should Blanchard forecast its demand?
3. Apply and test your methodology on the data given in Exhibit 5 of the case.

After addressing these questions, we will introduce a simple inventory model called the EOQ model in this class. The next class will discuss this model in depth.

Week 10: INVENTORY CONCEPTS AND MODELS

Reading

1. Read Chapter 17: "Inventory Control" in Custom-Text
2. Read "A Note on the Newsvendor Model: Inventory Planning for Short Lifecycle Items." (pdf available on course website)

Topics:

- Importance of Inventory
- Inventory Measures
- EOQ and Periodic Review Models
- Inventory Management under Uncertainty

Case: BLANCHARD IMPORTING AND DISTRIBUTING COMPANY, INC. (Included in the Course-packet)

Questions: Use the following questions to analyze Blanchard's inventory policy

Although the EOQ/ROP system may not be appropriate for Blanchard because of the inapplicability of the basic theoretical assumptions (which ones?), it is instructive to consider the operational feasibility of an EOQ/ROP system. Select Blanchard Vodka in quarts as an example product, and calculate the EOQ for this product. What would be the inventory policy that would result from this calculation?

CASE ASSIGNMENT #6: (Due at the Beginning of Class)

Carefully study the discussion that Hank has with Bob and Eliot towards the end of the case and answer the following questions:

1. Is an EOQ/ROP model suitable for Blanchard? Why or why not?
2. How does the method of Bob and Eliot differ from the EOQ/ROP method?

Case: L. L. BEAN, INC (Included in the Course-packet)

Questions

1. What are the challenges facing LL Bean in meeting demand for their products?
2. How does LL Bean use past demand data and a specific item forecast to decide how many units of that item to stock? Is this the best they can do?
3. What item costs and revenues are relevant to the decision of how many units of an item to stock?
4. How would you address the concerns of Rol Fessenden and Mark Fasold towards the end of the case?
5. How would you improve the forecasting and ordering process at LL Bean?

Week 11: INVENTORY IN ACTION

Topics: Beer Game and the Bullwhip Effect.

SUBMIT GROUP HOMEWORK #2: FILE WITH QUESTIONS WILL BE AVAILABLE ON COURSE WEBSITE

Week 12: SUPPLY CHAIN MANAGEMENT

Readings

1. Read Chapter 10: "Supply Chain Strategy" in Custom-Text
2. Read the article "The Bullwhip Effect in Supply Chains" (available on course website)
3. What Is the Right Supply Chain for Your Product? (available on course website)

Questions

In this class, we will draw inferences on supply chain performance from the beer game. Read the above articles, and use the following questions as guidelines to prepare for the class:

1. What problems did you face in meeting demand during the game?
2. In retrospect, how should you have determined your order quantities in every period in order to improve performance?
3. What information from your downstream and upstream players would have been useful in improving the performance of your supply chain?

Case: Zara: Fast Fashion

Questions:

1. What is Zara value proposition to customers? How is Zara's Supply Chain helping this value proposition? How is Zara managing the uncertainty in demand?
2. Under the Newsvendor paradigm, how would you compare the Overage and Underage costs of Zara and Gap?

CASE ASSIGNMENT #7: (Due at the Beginning of Class)

What are the operational factors that contribute to Zara's competitive advantage?
In your opinion, what should Zara do to keep its competitive advantage?

Related Links: NYT article "Dell, It Turns Out, Has a Better Idea Than Ford" available on course website.

FINAL EXAM

T.B.A

INDIVIDUAL CASE ASSIGNMENTS

There will be eight (8) case assignments throughout the semester. These assignments are a combination of analysis and brief explanations, and are designated as **SHORT PAPERS**. They should be **no more than two pages in length** (except where noted) and be submitted at the beginning of the session on which they are due. Keep a copy for your reference during class. Show all work if your response is a calculation. It will be helpful to read the assignment for the next week prior to class. If you have questions regarding the next assignment we can discuss them in class. These short papers should be submitted individually. The assignments have two purposes: some of them are meant to enable you to apply concepts and tools learned in the course, and others are designed to help you prepare for class. All assignments will be graded, and the grader will determine whether a submission represents a good faith effort to complete the work. The accuracy of the responses will be judged to the extent that concepts have been covered in class before the assignment due date.

CLASS PARTICIPATION

The development of speaking and listening skills is considered an important part of your evaluation in this course. Please use the following guidelines to determine your effectiveness in class participation:

- Your comments should contribute meaningfully to learning in case discussions and lectures
- There are no stupid questions
- Incomplete points or "one-word answers" will not get credit. Well defended and well thought out points will get due credit.
- There may be cold-calling. If you have not been able to prepare a case, or if you are uncomfortable with being called on in a particular class, please let the instructor know in advance of the class.
- There are no alternative assignments in lieu of class participation.