MEETINGS: Tuesdays and Thursdays 3:00-5:55 p.m.

INSTRUCTOR: Sridhar Seshadri, Room 867 KMC sshadri@stern.nyu.edu

OFFICE HOURS: Wednesdays 2:00-3:00 p.m. (subject to change)

REQUIRED COURSE MATERIALS:


COMPUTER SOFTWARE: EXCEL - For Linear Programming
HOM 3.0 - For other OM Topics

These programs are available on the computers in the labs.

TEACHING FELLOW: Andrey Torzhkov <atorzhko@stern.nyu.edu>
Office: Outside KMC 8-67
Office Hours: TBA
MATERIALS REQUIRED

1. CUSTOM TEXT (H&R): COMPETITIVE ADVANTAGE FROM OPERATIONS,

   And CASE BOOK (CB) (contains technical notes and cases)

   TERMS USED IN OPERATIONS MANAGEMENT
   ANALYSIS OF AN OPERATION
   FCN SECURITIES DEMO (A), (B) AND (C)
   ALLIED DISTRIBUTING EQUIPMENT, INC.
   THE FORD-FIRESTONE CASE
   SOUTH TREE ELECTRONICS (not used)
   FIRST CITY NATIONAL BANK

   BENIHANA OF TOKYO (not used)
   KRISTEN'S COOKIE CO.
   DONNER COMPANY
   BLANCHARD IMPORTING AND DISTRIBUTING COMPANY, INC. (not
   used)

2. THE GOAL, Second revised edition (Buy in Bookstore), Eliyahu
   Goldratt, North River Press, Inc. 1992

3. CASE TO BE PURCHASED

   TOYOTA MOTOR CO. CASE

Other cases and handouts will be posted on Blackboard.
HONOR CODE

I expect every student to be familiar with the Stern School of Business Honor Code. Some of the ways in which the code applies to this course are discussed below:

- The honor code stipulates that no student will lie, cheat, copy or otherwise behave in an unfair manner to obtain academic advantage over other students.
- As per the honor code, an individual’s name on a report should be included only if they have contributed to the analysis. If an individual has not contributed to the analysis in an intellectual manner, it is a violation of the honor code to include his or her name.
- Furthermore, you may not refer to case write-ups from classes offered in earlier semesters.
- The premise of the honor code is that ideas should be attributed to their source. Therefore, please acknowledge the main source(s) of data, facts, and ideas (other than from the instructor or textbook) in all your written work and when you make a presentation. If you use material from a source other than the lecturer, the textbooks or the lecture notes, you must attribute the source. For example, say, “I discussed this with the TA.” Or “I obtained this from the following website.”
- You may discuss the homework with your classmates, TA or me. However, you must do them individually. The discussion is limited to “how to solve” type of questions. The actual solution must be done individually. Do not be worried of getting the answer incorrect in the homework. Most of the points will be given for using the correct approach.

ELECTRONIC DISCUSSION

This course will use Blackboard. You are expected to post your comments, responses to other postings, questions and response to specific questions in the outline. In addition, you can: (a) post interesting examples illustrating concepts discussed in class, (b) questions about concept or calculations that are unclear in class, and (c) links to relevant websites.

The TA and I will be reading these discussions. Please keep the discussions strictly relevant to the course and the language as professional as possible. If you are responding to a specific question in the outline, please do so by 10:00 am of that day’s class.
MODULE 1: Introduction to Operating Systems:  
Process Design and Analysis

May 16  
SESSION 1A: INTRODUCTION - OPERATIONS AS A SOURCE OF COMPETITIVE ADVANTAGE

Concepts: The link between business and operations strategy, productivity, product-process matrix, service design matrix, process design and operational implications.

Class Plan:  
In this session we discuss the course contents, form groups, and discuss other details. The main themes in this session are: what are business processes, how operations management involves the design, planning, and management of business processes, and how operations is a source of competitive advantage for a firm.

1. Read Chapter 1 H&R (prepare but do not submit discussion questions 8, 9, 10, 11, 12 on p. 20 H&R)
2. Begin reading “The Goal” by E.M. Goldratt (should be completed before June 1)
3. To be discussed in class:
   * Recall some recent decisions made by you to purchase a product or to visit a service provider (hotel, air travel, bursar, etc.). What were the high and low points of your experience and why?

SESSION 1B: OPERATING SYSTEMS - TYPES OF OPERATING PROCESSES

Class Plan:  
In this session we discuss process choice. Two variables that affect the choice of a process are volume and variety. The choice of process goes beyond determining whether to mass-produce or make by hand. It also influences the labor skills, the degree of automation, the controls used, the IT and information systems, etc.
We study service operations to see if they have special characteristics that are different from manufacturing operations. For service operations, the key factors are the degree of customization versus the intensity of labor.

1. Read Chapter 7, pages 251-284 in H&R.
2. Read Terms Used In Operations Management (p. 1 CB).
3. Prepare discussion questions 2, 3, 6, 9, 11, 15, 16, 17 in H&R (p. 280) (prepare means read and get familiar with the answers, you do not need to submit. However, some of these questions may appear in the exams.)

4. Take at least one plant tour from the list below and prepare to discuss the questions given.

**Plant Tours**

In this class, we will study different types of operating processes and discuss their suitability for manufacturing various products. Some of these processes and products are illustrated in virtual PLANT TOURS accessible by visiting: http://www.mhhe.com/omc/tours-frames.htm

You may browse a few of these to further understand the types of operating processes.

**Recommended** tours are:

**Job shop:**
Stickley furniture  http://www.stickley.com/

**Continuous flow process:**
Monitor Sugar Company  http://www.monitorsugar.com/htmtext/btintro.htm
Hershey’s  http://www.hersheys.com/discover/tour_video.asp

**Assembly line process:**
BMW  http://www.bmwusfactory.com/build/

a) What would you expect to be the key elements of each company’s business strategy?
b) What would you expect to be the key elements of each company’s operations strategy? What is your assessment of the fit between each company’s business strategy and its operations strategy?
c) What are the major differences between the operations of the firms?

**Related Links:**
Operations Strategy  http://www.stern.nyu.edu/om/under_cafo/Seshadri/allrefs.htm#operations_strategy
List of topics and companies  http://www.stern.nyu.edu/om/under_cafo/Seshadri/allrefs.htm#general.refs

**REMINDER:** TERM PROJECT 1 DUE SESSION 4A. THE COMPANY MUST BE IDENTIFIED BY THE NEXT CLASS SESSION. SEE PAGE 18, IN SYLLABUS, FOR PROJECT DESCRIPTION.
May 18

SESSION 2A: PROCESS ANALYSIS: PROCESS CAPACITY AND PROCESS COST, FLOW TIME, PRODUCT VARIETY

Concepts and techniques: Process charting, capacity calculations, bottleneck, throughput time calculations, work assignment, Gantt charts, product costing, and process improvement. I = RT law.

Class Plan:
In this and the next session, we learn to analyze a business process in detail. The objectives of the analysis are: identify the process capacity, process cost, and time to serve customers. Additionally, understand how to execute orders, schedule labor, and identify bottlenecks.

Using a simple setting, we learn useful tools and techniques such as doing capacity calculations, throughput time calculations, work assignment, and scheduling. We also learn about Gantt charts and their uses.

The second session will focus more on the effect of product-mix on capacity. Together, the sessions provide insights into capacity management techniques that are used every day in businesses.

1. Read Chapter 7, pages 285-295 in H&R.
2. Read, analyze and be prepared to discuss the Kristen's Cookie Company case (p. 109 CB) utilizing the six key questions at the end as guides. In particular prepare question 3 below.
3. What are the cycle time, throughput time, and capacity of each operation and the whole production system?

SESSION 2B: PROCESS ANALYSIS: PROCESS CAPACITY AND PROCESS COST, TIME, VARIETY

Class Plan:
We continue the discussion of the Kristen's Cookie Co. case. The theme in this session is to understand how factors such as lot size and product variety affect the capacity of an operation. We shall link these ideas back to the book "The Goal." We will also briefly touch upon process improvement. We come back to the strategy of the firm and the design of the process.

1. Homework 1: Draw a Gantt chart for Kristen's operation assuming orders are for two-dozen cookies, orders come every 20 minutes AND Kristen’s roommate is absent. Submit this analysis at the beginning of next class (May 23).

YOUR GROUP MUST SUBMIT THE NAME, ADDRESS, AND BRIEF (1 OR 2 SENTENCES) DESCRIPTION OF THE COMPANY YOU ARE SELECTING FOR YOUR GROUP TERM PROJECT. PLEASE MAKE SURE TO OBTAIN THE PERMISSION FROM THE LOCAL MANAGER.
May 23
SESSION 3: PROCESS CHOICE EXERCISE
in Abbe Bogen Lounge, 11th Floor of KMC

1. Please read the Toyota Motor Company Case before class (case purchased separately from main bookstore)
2. Be prepared to discuss the root cause of the seat problem.

Electronic discussion: What is the root cause of the seat problem in the Toyota Motor Co. case?

Term Project 1: Prepare and submit (at the beginning of class on May 25) a definition of the organization you have chosen in terms of (see p. 19 for more details):
   a) Goals of the organization
   b) Product or service offered
   c) Market
   d) Competitive strategy
   e) Customers
   f) Workers

Related Links:
Process Analysis http://www.stern.nyu.edu/om/under_cafo/Seshadri/allrefs.htm#process_analysis

MODULE 2 Managing for Competitive Advantage: Time-to-Market & Responsiveness

May 25
SESSION 4A: THE EFFECTS OF SET-UP TIME ON CAPACITY

Concepts: Set up time, external and internal set up, batch size, effect of product-mix on capacity, order size - cost - due dates. Matching process and firm strategy.

Class Plan:
In this class, we study the effect of set-up time on capacity. The Donner Company (p. 113 CB) case will also serve as another example for analyzing processes. The process in this case is quite complex, but we will see that the simple but powerful ideas of capacity management that we have learnt so far, such as, identifying and managing the bottleneck, will prove to be adequate even for managing the most complex processes. I urge you to explore the spreadsheets before class.

1. Read the Donner Company case (p. 113 CB). Use the EXCEL spreadsheets discussed in the previous class (Donner.xls and Donner1.xls) to analyze and understand the relationships between number of orders (set-ups) in a month, order size, and capacity
2. Use the following study questions as guides in analyzing the case:
   a) Describe Donner as an operating process. To simplify this task, consider only the flow of the most important output.
b) Assume Donner has to process 60 orders in a certain month. What is the capacity (in terms of the number of boards) of each operation and of the entire system?

c) What factors influence the capacity of the entire system? What is the current utilization of the machines?

d) What was the efficiency of Donner?

e) What are the causes of the major problems described at the end of the case? How would you propose to resolve them?

Electronic discussion: You could choose to post your analysis to questions (c) and (e) in the discussion board of Prometheus.

Related Links:

SESSION 4B: TIME BASED COMPETITION

Concepts: Critical time, planning and control issues for projects, work breakdown structure (WBS), drawing project networks, cost-time analysis.

Class Plan:
Competing based on time means being able to execute large projects, on time and within cost. In this session we first discuss the value of time-based competition.

Then, in this and the next session, we learn about network techniques for planning and managing large projects. Successful project management involves planning and managing the time to complete the project, monitoring the use of resources during project execution, and increasing the probability of successful completion. Network planning and control techniques provide the tools necessary for undertaking these tasks.

1. Read Chapter 3 in H&R (p. 53 H&R). Attempt the discussion questions at the end of the chapter. These do not have to be submitted.
2. Draw the networks for the projects described in the FCN/Securities Demo (A) exercise (p. 30 CB).
3. Homework 2: Submit: The network for the Allied Distributing exercise (p. 33 CB) (no need to analyze beyond drawing the network). Make suitable assumptions to draw the network.

Electronic discussion: When is a project said to be successful? What are the critical factors for successful project management? Give examples. You may like to look back on the Internet boom as well as some successful (non-military) projects in recent years (conversion from tokens to metro cards in NYC, introduction of the euro, the cooper mini).

REMINDER: TERM PROJECT 2 DUE SESSION 6A. SEE PAGE 20, IN SYLLABUS, FOR PROJECT DESCRIPTION.
May 30
SESSION 5A: PROJECT MANAGEMENT

Class Plan:
We will discuss the probabilistic methods for project analysis. We will also touch upon project crashing. We will learn why it is sometimes beneficial to reduce the duration of a project, even though it may increase the cost of the project. We will discuss project crashing techniques that optimally reduce the duration of a project by selectively reducing the duration of only certain activities.

1. Read, analyze and be prepared to discuss the other four project management network cases (exercises) assigned in class: FCN (B), FCN (C) (p. 31 CB), Specialty Contractors, and Aerospace Components (p. 35 CB).
2. **Homework 3:** Submit an analysis and solution to the FCN (B) case. HOM can be used to do the homework. HOM can be downloaded from Blackboard.

Related Links:
Please visit the website of Primavera (http://www.primavera.com/) to see examples of the state-of-art network planning tools.

SESSION 5B: THE EFFECTS OF UNCERTAINTY - WAITING LINES

Concepts: Uncertainty - time scale and planning demand and supply, service level in queues, cost-service tradeoff in queues, queueing formulae -- averages and distribution of number of customers in system and time spent in the system, revisit I = RT law. Dynamics of processes.

Class Plan:
Recall Pete's people who were trying to beat the robot? Demand and supply often do not match. The mismatch creates special problems for managers. To understand these problems it is important to understand the time-scale at which these uncertainties happen. Very long and gradual changes in demand can be dealt with using techniques for managing seasonal demand. Medium term uncertainties, such as day-to-day fluctuations in demand levels, can be dealt with using staffing solutions and overtime. Demand uncertainties on the same time scale as operational variables such as processing time or set-up time need special techniques. These techniques are called waiting line or queueuing techniques. We learn a bit about the other two and lot more about the waiting line techniques in this and the next session.

Regarding waiting lines, we learn: why uncertainties in processing times as well as arrival patterns create delays? These delays are due to queues. We learn why queues form? How to estimate the queueing delays? How to plan for extra capacity to reduce unwanted delays? And how to reduce uncertainty?
1. Read Quantitative Module D in H&R on Waiting Lines and Queuing Theory (p. 743-755 H&R).
2. Prepare the sixteen discussion questions at the end of Module D in H&R (p. 762). Do not submit.

**Electronic discussion:** What happens when demand and supply do not equal one another? What do firms do? What do customers expect? Give examples.

**June 1**

**SESSION 6A: QUEUEING THEORY IN ACTION**

Concepts: Design of queueing systems, staffing, scheduling, psychology of queues.

**Class Plan:**
We apply waiting line techniques to analyze the **First City National Bank** case (p. 83 CB). In particular, we discuss whether S-lines are better than single lines, whether and when specialization using dedicated servers is preferred, as well as, several psychological factors that affect the perception of "waiting" in lines.

1. **Homework 4:** Submit the solutions to problems D3, D7, D9 and D11 in H&R (p. 764-765) on June 1. HOM can be used to do the homework. HOM can be downloaded from Blackboard.

2. Read, analyze, and be prepared to discuss the First City National Bank case (p. 83 CB). The following study questions will help:
   a) Considering the data supplied for arrival and service times, how would you calculate an average arrival rate and service rate?
   b) As Mr. Craig, what characteristics of this queueing system would you be most interested in observing?
   c) What is the best number of tellers to use?
   d) Calculate the waiting time for a customer (time spent in the queue before service) and determine which of the two line configurations you would recommend. Support your result with the appropriate quantitative queuing analysis.

**Term Project 2:** Prepare and submit (at the beginning of class on June 1) a description of the workflow in your organization. Follow these suggested questions for your description (also see p. 20): What are the tasks and how are they linked, ordered, etc.? What/where/when do they receive raw materials, subassemblies, etc.? At what stage of the process are outputs produced? How does information flow? Is your organization a flow, job or project shop? Draw a process diagram. What are the measures of capacity for the organization? What is its capacity? Do you notice any activities that do not add value to the organization? (4-5 pages).
SESSION 6B: AN INTRODUCTION TO RELATED TOPICS IN PROCESS ANALYSIS

Class Plan:
In this session we shall review process analysis concepts. We shall also learn about many applications of process analysis. We shall discuss issues of product-mix and profitability, process design for suppliers, process design and quality management, etc. This will set the stage for the rest of the course.

PICKUP MIDTERM PROBLEM SET FOR SUBMISSION. THESE MUST BE DONE ON INDIVIDUAL BASIS. DO NOT CONSULT WITH ANY ONE EXCEPT THE PROFESSOR OR THE TEACHING ASSISTANT. DUE BACK JUNE 6.

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OPTIONAL SESSION

June 2, 2006: Screening of the movie “The Goal”
Show time: 9 to 10 am (first come first seated); Place: Tisch UC 52.
The book, The Goal, has been turned into an excellent movie. The length of the film is 50 minutes. From feedback received and own experiences, seeing the movie after reading the book greatly enhances the learning experience. The viewing is completely optional. Seats will be filled on first come first seated basis. Please bring your own popcorn.

Related Links:

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MODULE 3 Managing for Competitive Advantage: Quality as a Strategic Issue

June 6
SESSION 7A: QUALITY - ITS DEFINITION AND BASIS FOR COMPETITION

Concepts: Quality its definition, analysis, planning and control. Dynamics of processes. Type I and Type II errors, process control and process capability, six sigma quality.

Class Plan:
In this session we discuss quality management in the context of the Ford-Firestone tire recall case. The objectives of the session are to understand what is quality, what are the costs associated with it, and raise questions about managing quality in the age of super-mass production. These questions will be answered in the next two sessions.

1. Read the Ford-Firestone case (p. 39 CB) and be prepared to discuss it. In particular attempt question 4 below to determine what was the true cause of the problem?
2. Prepare a Fishbone Diagram of the problem.
3. Read Chapter 6 in H&R (p. 191 H&R).
4. Prepare discussion questions 4, 5, 7, 9, 12 and 19 H&R (p.212).

**Homework 5:** Submit: Prepare and submit a fishbone diagram showing the probable causes for the tire failure problem (as set out in the case). A fishbone diagram shows probable causes for a problem such as: due to manufacturing, materials, design etc.

**Electronic discussion:** Post your views on the recall. How does it compare with other product recalls? Are product recalls inevitable? Can the society do something about them?

**SESSION 7B:** QUALITY CONTROL -Introduction to Six Sigma

**Class Plan:**
In this session we learn about statistical process control. We discuss how statistical process control techniques are used in many different industries.

1. Read the Supplement to Chapter 6 in H&R (p. 221).
2. **Homework 6:** Submit problems S6.6, S6.9, S6.19 and S6.21 (p. 244-247) on June 13, 2006.
3. Revisit the Toyota case and suggest whether the use of six sigma technique and statistical process control can be used in Toyota? (Good exam question)

**Electronic discussion:** What service industries will most benefit from the use of statistical process control? ISO 9000? Give examples.

**Related Links:**
Visit the American Quality Control Society's website:
http://www.asq.org/portal/page?_pageid=33,39211,33_39236&_dad=portal&_schema=PORTAL
Total Quality Mgmt
http://www.stern.nyu.edu/om/under_cafo/Seshadri/allrefs.htm#total_quality_management
Accelerated Life Testing
http://www.stern.nyu.edu/om/under_cafo/Seshadri/allrefs.htm#Accelerated
Six Sigma http://www.stern.nyu.edu/om/under_cafo/Seshadri/allrefs.htm#Six_Sigma

**REMINDER:** TERM PROJECT 3 DUE JUNE 13. SEE PAGE 21, IN SYLLABUS, FOR PROJECT DESCRIPTION.

**Term Project 3:** (You may choose to do either Term Project 3 or 4.) Prepare and submit (at the beginning of class on June 13) answers to the following questions: How does quality affect your operations? Does it affect throughput, demand, facility/staff size etc.? How do you define and measure quality? How would you go about improving quality? (3-4 pages).
MODULE 4  Managing for Competitive Advantage:
Supply Chain Management

June 8
SESSION 8A: INVENTORY AND LOGISTICS

Concepts: EOQ, safety stock and cycle service level, effect of scale on inventory cost, risk pooling and safety stock. If time permits, transportation and logistics concepts. Dynamics of processes.

Class Plan:
In this and the next two sessions, we discuss inventory management and more broadly supply chain management. Material, information and funds flow through supply chains. Demand is matched with supply, orders with fulfillment, and products are planned to fill customer needs and to compete against other products in the market. The integrated management of the three flows, material, information, and funds, is called supply chain management. We learn how firms compete using new principles of supply chains. We also learn how inventory, one of the fundamental levers for managing supply chains, can be analyzed and managed.


SESSION 8B: THE ROLE OF INVENTORY - THE TRADITIONAL VIEW

Class Plan:
In this session we explore the effect of centralization on inventory costs. We see how scale economies can be derived even in very ordinary situations. We then discuss alternate ways of deriving these scale advantages.

1. Read and analyze the Xenon Drives case (download from Blackboard). Be prepared to discuss questions 1, 2, 4 and 6
2. Homework 7: Answer and submit question 1 in the case.
3. Pick up problem set for inventory management. Not to be submitted.

Electronic discussion: What are the operational challenges and opportunities faced by Walmart? How do these relate to supply chain management? Are these different for a retailer such as Gap or Circuit City?

REMINDER: TERM PROJECT 4 DUE SESSION 10. SEE PAGE 22, IN SYLLABUS, FOR PROJECT DESCRIPTION.

Term Project 4: Prepare and submit (at the beginning of class on June 15) answers to the following questions: Can your product or service be inventoried? How does your organization handle inventory? What policy does it use for replenishment? How would you implement a "Just-in-Time" philosophy in your environment?
June 13
SESSION 9: INVENTORY IN ACTION: THE BEER GAME
in Cantor Boardroom, 11th Floor of KMC

PLEASE BE A FEW MINUTES BEFORE TIME!!

Read Chapter 11 of H&R. Skim through the chapter.

Related Links:
What is systems dynamics? http://www.albany.edu/cpr/sds/

June 15
SESSION 10A: JUST-IN TIME and LEAN PRODUCTION
Concepts: Just-in-time, continuous improvement, firm strategy based on continuous improvement.

Class Plan:
We debrief the beer game and discuss how firms manage to smooth product flows in supply chains. We conclude Module 4 with a discussion of Just-in-Time production systems. We learn the key operating principles behind such systems. We also learn about the firms that have adopted such production systems. Revisit the Toyota case!
1. Debrief of the Beer Game
2. Read Chapter 16 in H&R on Just-in-Time systems (p. 625).
3. Discussion questions 1, 3, 4, 6, 7, 9, 10, 11, and 12 H&R (p.646).

MODULE 5 Allocating Resources for Strategic Capacity Planning
June 15
SESSION 10B: THE BASIC LP PROBLEM

Concept: Modeling operations problems for optimization of processes, product-mix, diet and transportation problems, solution techniques.

Class Plan:
We begin the last module, which is integrative in nature. It deals with the use of linear programming for planning and optimizing systems. We shall discuss several applications of LP to Operations Management problems.

1. Read Quantitative Module B: Linear Programming in H&R (pages 692-707). You may do the first reading for a quick overview.
2. Read (more carefully) pages 692-707, again.
3. Prepare to discuss questions 1,2,3,7, 8, 9, 10, and 13 H&R (p.712).
4. Homework 8: Attempt Problem B.1 on page 713 and submit on June 20.

Related Links:
Linear Programming and other Operations Research Topics http://www.informs.org/Resources
June 16
COURSE ENHANCEMENT DAY

Final Project Report
(9 am to 2 pm, KMC 2-65)

Please submit the Final Project Report of the Term Project at this session. The final report consists of the three earlier reports plus a 2-3 page executive summary. In the executive summary, list your conclusions and recommendations to management and discuss possible implementation. You may want to consider the comments you have received on earlier reports.

Prepare a 15-minute PowerPoint presentation to be given to the entire class. In particular, please be prepared to stay the whole day, starting from 9:00 am until 2 pm.

June 20

SESSION 11A: SOLUTION TECHNIQUES: GRAPHICAL METHOD AND ENUMERATING THE CORNER POINTS

Concepts: Sensitivity (what-if) analysis, shadow price, formulating for solution using Excel’s solver, interpreting Excel solver output

Class Plan:
We learn how to solve LP problems by hand using a graphical technique. We also learn to carry out sensitivity analysis.


SESSION 11B: LP SOLUTION (LINDO OR EXCEL INTERPRETATION)

Class Plan:
We learn how to formulate and solve LP problems using Excel. How to interpret Excel outputs for LP problems.

1. Homework 9: Solve problems B.2 and B.3 on page 713-714 using (a) graphical method, (b) "enumerating the corner points" method and (c) Excel. Submit on June 22.
2. Interpret the results
3. Review of course and sample examination will be handed out.

Related Links:
Linear Programming and other Operations Research Topics http://www.informs.org/Resources
Visit the website of ilog and look under OPL Studio. http://www.ilog.com/
Optional review session on June 21. Time will be announced in class.

June 22

**SESSION 12:** FINAL EXAMINATION: Last day of class. In-class, open book and open notes. No laptops allowed. The examination will be comprehensive. Sample exam and solution will be provided.
GRADING

Class Participation, Attendance 15%
Electronic Participation 5%
Mid-Term Take-Home Problems (Open book) 10%
Final Examination (Open book) 35%
Short Reports, Term Project (Group work) 20%
Homework, Quizzes 15%

TERM PROJECT
Groups of students (maximum 5) will be formed to undertake a term project as part of the course requirements. Your group will choose a local operation to study (preferably, select an operation that is not located between 8th Street and Houston Street). Examples are: a branch of a bank, green-grocery, supermarket, restaurant, auto-body shop, record store, drug store, copy shop, etc.

At four times during the course, you will be asked to submit a short report that describes and analyzes a different aspect of the operating system of the company that you have selected. You must submit the first two reports, and you have a choice of doing either the third or fourth report. Your responses in these short papers will form the basis of the final term project that will be handed-in at the end of the semester.

HOMEWORK
There are nine homework assignments. The homeworks are due on the dates (sessions) where the assignments appear in the syllabus. Only homeworks that are specifically designated as SUBMIT, are to be handed-in at the beginning of class. Keep a copy of all homework submitted for reference during class. When discussion questions are involved, please answer briefly (two or three sentences).

Homework will be graded, and will not be accepted late. It must be prepared individually in order to receive credit.

QUIZZES
Quizzes might be given in any class in which a case is to be discussed. The quiz will relate to facts given in the case and study questions asked in the syllabus.

HOW TO PREPARE FOR CLASS DISCUSSIONS
Please read the cases carefully. Use the study questions supplied in the syllabus as a guide. Be prepared to be called-upon to present the facts of the case, or to carryout the analysis indicated by the study questions.
### OVERVIEW OF ASSIGNMENTS WITH DUE DATES

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Details of Project Reports

**Term Project 1:** Overview of firm and key operational considerations/problems.

Please get permission from the manager of your firm!! Very critical!!!

Length of the project: 4 pages (double spaced). You may wish to cover the following aspects of organization:

a) Goals of the organization -- try to keep this limited to the local branch or store
   - Mission
   - Performance till date
   - Expected performance (annual and 5-year)

b) Product or service offered-- try to keep this limited to the local branch or store
   - What are the Categories or products or services offered
   - Sales per category (or what are the major and which are the minor ones)

c) Market
   - Estimated share of market
   - Expected growth rate of market

d) Competitive strategy
   - Competitors profile
   - What is different about your firm?

e) Customers
   - Who are the customers, where do they come from (local or otherwise), are there regular ones?
   - Demographic profile
   - Psychographic profile

f) Workers
   - Number
   - Skill level (or education)
   - Training provided by branch or firm
   - Maybe an organization chart

g) What does the manager think the top 2-3 issues are with regard to business and with regard to operations? What are your viewpoints about it?
**Term Project 2: Process Design and Process Analysis**

Length of the project: 4-5 pages (double spaced) – exhibits can be included as appendices

Concepts that may apply: Characteristics of services, design of products/services, analysis of processes.

Suggested methodology:
1. Determine the key success factors for your firm.

2. Make an exhaustive list of all processes.
   a) How are they linked, ordered, etc.?
   b) What/where/when do they receive raw materials, subassemblies, etc.?
   c) At what stage of the process are outputs produced?
   d) How does information flow?
   e) Is your organization a flow, job or project shop?
   f) What are the measures of capacity for the organization?
   g) Do you notice any activities that do not add value to the organization?

3. Choose 1 significant process to study. Discuss it with the TA or the professor. List out the specific objectives for these processes.

4. Draw a process diagram, indicating the inventories and information flows.

5. Analyze the process qualitatively like we did in class. How is value being created? How does each step of the process support the business -- apply the key success factors. What are the excellent ideas you see in the process steps? Is there scope for improving the process?

6. What is the capacity and throughput time of the process? How can capacity be changed? Can Throughput time be reduced? Is there an example of setup time, lot size? Can set up time be reduced?

7. Draw a layout (a drawing of where the action takes place) and comment on improvements that can be made. A sample layout is shown in the Benihana case. This may not be appropriate for all projects -- please use your judgment.

8. If you had a chance to redo the entire process, what alternate process design would you suggest and why?
Term Project 3: Total Quality Management

This part of the project is more open ended than the rest. You can choose to do some of the following (I suggest the first five and rest optional):

1. **Quality has several dimensions**: Performance, Features, Reliability, Durability, Serviceability, Response, Aesthetics, Reputation, Safety, Assurance, Empathy, … Define quality for your firm’s product or service that you studied in part 2 of the project along these dimensions.

2. Take one, or two, dimensions and ask how will you **measure quality along these dimensions**? You must specify a method that will yield a *quantitative measure*. Note that measurement can be done using industry standards, observation, by comparison against a "standard" product or service, as well as by asking customers' for their opinion.

3. Take a particular dimension and actually **measure** quality.

4. Compare the measurement with a *benchmark*. How will you get this benchmark? Study competition or use the measures from another process, which is known to be excellent.

5. Take a particular step in the process (you have chosen) and ask how you can use SPC (statistical process control) ideas. Does the firm use acceptance sampling? If yes, give an example and provide a critique of their methods.
   - Can you make this step fool proof?
   - What type of automation will help?
   - How can this step be designed to produce *zero defects and also give the required capacity*?

6. How does the firm's philosophy towards quality relate to what we have learnt in class?
   - Is Continuous improvement suitable or should quality be improved in quantum leaps? Which aspects of the firm's products, services and processes are amenable to the use of the continuous improvement philosophy?
   - Is ISO 9000 certification important to your firm? Does the firm have a quality system, i.e., a set of written procedures? How recently have these procedures been reviewed? If they do not have written procedures how are they able to ensure consistent delivery of quality service?
   - Does the organization's philosophy, use of tools and techniques, and people support the TQM concept? What constructive suggestions would you provide to the firm in this regard?
**Term Project 4: Inventory Management**

This part of the project is all about inventory management at your firm.

1. Can your product or service be inventoried? If yes, how? What is the inventory cost (holding and ordering cost) in your firm? Estimate by sampling. How many weeks of inventory do they keep? Is it same for all items?

2. How does your organization manage inventory? What systems does it use? How does it maintain control and efficiency? You can show forms or describe how they take stock of inventory, do they order every item similarly, how many weeks of stock do they want to carry, etc. What is their safety stock policy? What service level do they aim for?
   This is the big part of the report.

3. What policy does it use for replenishment?
   When and how they decide to replenish inventory? Is it continuous or periodic review? Should they think of changing the policy?

4. Can you suggest improvements?
   I suggest doing an ABC analysis. Determining how much inventory they carry of A, B and C items (total for all A, all B etc). This can be done by estimating (sample a few items and see how much they carry -- extrapolate to the rest).

   Compute some inventory turns for the sample items.

   See if you can help reduce inventory or even increase if you think it is important. For this, try applying EOQ for a few sample items.

4. How would you implement the Just in Time philosophy for your environment?

   Does it make sense to do this? Can the vendors manage inventory?

5. Should you implement cycle counting? Do they use it? What is the accuracy of inventory records (difference between actual inventory and inventory on the books)?