STERN SCHOOL OF BUSINESS  
NEW YORK UNIVERSITY  

COURSE SYLLABUS  
OPERATIONS MANAGEMENT  
Spring 2017  

MEETINGS: Saturday 9 – 12 am  
INSTRUCTOR: Lucius Riccio  
OFFICE HOURS: By Appointment  
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TEACHING ASSISTANT: TBD  
Office Hours: By Appointment  
Email:
MATERIALS REQUIRED

CUSTOM TEXT:  COMPETITIVE ADVANTAGE FROM OPERATIONS

This customized text was prepared from Operations and Supply Management; Jacobs, Chase and Aquilano.

CASE and READINGS PACKET


COMPUTER SOFTWARE:
  • EXCEL

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.
GRADING

Class Participation, Attendance, Quizzes  10%
Examinations (Open book)     60%
Homework                      30%

HOMEWORK

You will be assigned homework on a regular basis for each topic. The homework assignments are due on the dates (sessions) as stipulated in the syllabus, but those dates are subject to change based on class conditions. Only homeworks that are specifically designated as submit are to be handed-in at the beginning of class. Please keep a copy of all homework submitted for reference during class.

Homework will be graded, and will not be accepted late. Unless specified as a group assignment, they must be prepared individually in order to receive credit. Please write clearly or word process your homework.

QUIZZES

A quiz might be given in any class. The quiz will relate to the class material of that day. You are expected to come to class.

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, to come to the board to present charts, or to carryout the analysis indicated by the study questions.

HOW TO PREPARE A CASE REPORT

Case reports should be concise, no more than 2 pages of written material. You may attach charts, diagrams or data to that two-page report. Your report should answer all questions either specified.

Exams

There will be two in-class, open book, open note exams. Each will be worth 30% of your final grade.
 MODULE 1: Introduction to Operating Systems: 
Process Design and Analysis

SESSION 1: INTRODUCTION – OPERATIONS AS A SOURCE OF COMPETITIVE ADVANTAGE

**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.

SESSION 1A: PROCESS ANALYSIS: PROCESS CAPACITY AND PROCESS COST, TIME, VARIETY

**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 pick up useful tools and techniques such as capacity calculations, throughput time calculations, work assignment, and scheduling.

Together, the sessions provide insights into capacity management techniques that are used every day in businesses.

**Homework Readings (for next class):**
1. Begin reading “The Goal” by E.M. Goldratt (Finish by Session 4)
3. Read Chapter 6 Process Analysis (Chapter 5 in 13th Edition)
Prepare and Submit For Next Class:
1. *Homework #1*: Read, analyze and be prepared to discuss the Kristen's Cookie Company case utilizing the six key questions at the end as guides.
2. Draw and **Submit** two Gantt charts for Kristen's operation, one assuming all orders are for one dozen cookies and the second assuming orders are for two-dozen cookies. All one dozen orders come every 10 minutes and two dozen orders every 20 minutes. Assume Kristen’s roommate is helping.
3. What are the cycle time, throughput time, and capacity of each operation and the whole production system for each case? Note these on your charts.

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

**Class Plan:**
In this session, we discuss the strategy of Kristen’s Cookies. We shall observe how various elements of the operations strategy of Kristen’s come together to support its business strategy. This will enable us to identify the key factors that determine success and failure from an operations viewpoint.

SESSION 2A: PROCESS DESIGN AND FIRM STRATEGY

**Class Plan:** In this session we discuss process choice. Two of the 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.

Homework Readings for Next Class:
1. Read Chapters 9 and 9a Quality and Process Capability
2. Read for class discussion Shouldice Hospital

Prepare and Submit For Next Class:
*Homework #2*: Prepare and **Submit** a case report for National Cranberry. The questions will be provided.
SESSION 3: OPERATING SYSTEMS – PROCESS CHOICE AND IMPLICATION FOR OPERATIONAL VARIABLES

Class Plan:
We will review National Cranberry. We continue the discussion of analyzing business processes and determining process performance such as capacity, throughput, and cycle time. In this session, we will begin 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 discuss Shouldice Hospital. We will discuss the design of business processes and determine on what basis we should be making design decisions. We will discuss business strategy and its implications on operations design and process choice.

MODULE 2: Managing for Competitive Advantage:
Quality as a Strategic Issue

SESSION 3A: QUALITY – ITS DEFINITION AND BASIS FOR COMPETITION

Class Plan:
In this session we introduce quality management concepts. 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.

Homework Readings For Next Class:
1. Read for Discussion the Hank Kolb Case
2. Read Chapter 17 Inventory

Related Links:
SUVs: http://www.fordvehicles.com/suvs
Tires: http://www.firestone.com/
The Government Regulators: http://www.nhtsa.org/
The W. Edwards Deming Institute: http://www.deming.org/
SESSION 4: QUALITY ANALYSIS, MEASUREMENT AND IMPROVEMENT, AND STATISTICAL QUALITY CONTROL

Class Plan:
In this session we learn about the two faces of quality. What does a customer want? What can a process deliver? And, how to manage their interaction. We shall discuss useful quality management tools, such as, the fishbone chart, Pareto analysis, and process control charts. We will also learn about six-sigma quality. Specifically:
1. What is six sigma quality and how it applies to product and process design?
2. What is process capability? How to measure process capability?
3. How does six sigma quality relate to the teaching of Deming?
4. What is meant by "Quality is free."
In this session we learn about statistical process control. We discuss how statistical process control techniques are used in many different industries.

Related Links:
Total Quality Mgmt: Lib.upm.edu.my/iistqm.html
Integrated Quality Dynamics, Inc: www.iqd.com
Six Sigma at GE: http://www.ge.com/sixsigma/
Visit the American Quality Control Society's http://www.asq.org/ website

MODULE 3: Managing for Competitive Advantage: Inventory Concepts and Models

SESSION 4A: INVENTORY / LOGISTICS

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.
Homework Readings For Next Class:
1. Read Chapter 10 Supply Chain Strategy

Prepare and Submit For Next Class:
1. Read the Ford-Firestone case and be prepared to discuss it.
2. Homework #4: 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.
3. Homework #5: Do Problems 6, 12, and 15 in Chapter 9A Pages 349, 351, and 352 (Pages 328-331 in 13th Edition)

Related Links:
I2: http://i2.com
KMART files for bankruptcy http://money.cnn.com/2002/01/22/companies/kmart/

SESSION 5: THE ROLE OF INVENTORY - THE TRADITIONAL VIEW FOR MATURE PRODUCTS, INVENTORY MODELS

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. We will look at the effect of demand variability on inventory decisions.

SESSION 5A: INVENTORY MANAGEMENT – THE SUPPLY CHAIN VIEW – MATCHING DEMAND AND SUPPLY

Class Plan: We will introduce advanced Supply Chain and Just In Time principles. We learn the key operating principles behind such systems. We also learn about the firms that have adopted such production systems.

Reading Homework For Next Class:
1. Chapter 12 Lean (Just In Time) Manufacturing (Chpt 13 in 13th Edition)

Prepare And Submit For Next Class:
1. **Homework 6**: Pick up inventory problems to be solved and **submit**.

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SESSION 6 SUPPLY CHAIN AND JUST IN TIME PROCESSES
MIDTERM REVIEW

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SESSION 7: MIDTERM EXAM

**Preparation for Next Class:**

Read Beer Game Material

**Related Links:**
Lean Operations [http://www.stern.nyu.edu/om/under_cafo/Seshadri/allrefs.htm - lean_operations](http://www.stern.nyu.edu/om/under_cafo/Seshadri/allrefs.htm - lean_operations)

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SESSION 8 & 8A: INVENTORY IN ACTION: THE BEER GAME

**PLEASE BE A FEW MINUTES EARLY AND BE READY TO PLAY AT 6PM SHARP !!**

**Related Links:**
What is systems dynamics? [http://www.albany.edu/cpr/sds/](http://www.albany.edu/cpr/sds/)

**Homework Reading For Next Class**

1. Read Chapter 8A Queueing (7A in 13th Edition)

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**MODULE 4: Operations Analysis Techniques**
Understanding Variability

SESSION 9: THE EFFECTS OF UNCERTAINTY - WAITING LINES

Class Plan:
Recall Pete’s people (The Goal) 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 queuing techniques. We learn a bit about the other two and lot more about the waiting line techniques in this and the next session.

We learn how variability in processing times and arrival patterns create delays. These delays are due to queues. We learn why queues form? How to estimate the queuing delays? How to plan to extra capacity to reduce unwanted delays? And how to reduce uncertainty?

SESSION 9A: QUEUEING MODELS

Class Plan:
We will examine models of waiting lines. In particular, we discuss whether single lines are better than multiple lines, whether and when specialization using dedicated servers is preferred, as well as, several psychological factors that affect the perception of "waiting" in lines.

Homework Readings For Next Class:
1. Read Chapter 19A Simulation
2. Read Chapter 2A Linear Programming (Appendix A in 13th Edition)

Prepare and Submit For The Next Class:
1. Homework #7: Read, analyze, and be prepared to discuss the First City National Bank case. Submit a case report. 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 queuing 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.

SESSION 10: AN INTRODUCTION TO SIMULATION AS A PROBLEM SOLVING TOOL FOR OPERATING SYSTEMS

Class Plan:
First we will complete Queuing with a discussion of First City National Bank. Then we will introduce simulation as a useful tool to study processes. It is widely used in practice to answer different types of questions, such as, what should be the configuration and capacity of facilities, what scheduling rules should be used, how should due-dates be assigned to customer orders, how does yield impact process performance etc. We will cover Monte Carlo Simulation techniques and their application to a variety of operations problems. In this session we shall learn about discrete event simulation.

Related Links:
A simulator add-in to Excel: Crystal Ball [http://www.crystalball.com/]

Arena is an industrial strength simulation software. You can read more about it at: [http://www.arenasimulation.com/]

Allocating Resources for Strategic Capacity Planning

SESSION 10A: THE BASIC LINEAR PROGRAMMING (LP) PROBLEM SOLUTION TECHNIQUES: GRAPHICAL METHOD AND ENUMERATING THE CORNER POINTS

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. We learn how to solve LP problems by hand using a graphical technique. We also learn to carry out sensitivity analysis.
Related Links: Linear Programming and other Operations Research Topics  
http://www.informs.org/Resources

Related Links:  
Visit the website of Ilog and look under OPL Studio. http://www.ilog.com/

Related Links:  
Linear Programming and other Operations Research Topics:  
http://www.informs.org/Resources

Related Links:  

Homework Reading For Next Class:  
1. Read Chapter 3 Project Management (Chapter 10 in 13th Edition)

Prepare and Submit For Next Class:  
1. Homework #8: Simulate First City National Case as Described in the Handout  
2. Homework #9: Pick Up Linear Programming Problem Handouts

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Time-to-Market & Responsiveness

SESSION 11: TIME BASED COMPETITION

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.
Related Links:
Not all projects are successful. The links below contain examples of major engineering project failures in the last century.

Denver Airport
http://www.eee.bham.ac.uk/dsvp_gr/roxby/ee4a3/Lecture2/index.htm

Challenger
http://www.tsgc.utexas.edu/archive/general/ethics/shuttle.html
http://history.nasa.gov/sts51l.html

Other failures
http://www.cds.caltech.edu/conferences/1997/vecs/tutorial/Examples/Cases/failures.htm

SESSION 11A: 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.

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

Prepare and Submit For Next Class:

1. *Homework 9: Submit:* Solutions to Project Management problems handed out in class.

SESSION 12 FINAL EXAM