UNIVERSITY OF SOUTHERN CALIFORNIA
Marshall School of Business

BUAD 311 - Operations Management
Fall 2008

Instructors:	Yehuda Bassok	**Hiroshi Ochiumi**
Office:	BRI 400F	**BRI 401M**
Office Hours:	W 2:00-4:00pm & Th 10:00-12:00pm	**T 1:00-3:00pm**
Phone:	213-821-1140	**213-740-9918**
Email:	ybassok@marshall.usc.edu	**ochiumi@marshall.usc.edu**

Instructors:	Ashok Srinivasan	Leon Zhu
Office:	BRI 401F	BRI 400E
Office Hours:	T&Th 2:30-4:00pm	T&Th 1:00-2:30pm
Phone:	213-821-3633	213-740-7598
Email:	ashoksri@usc.edu	leonyzhu@marshall.usc.edu

Course Description

How do organizations such as financial institutions, health care, and manufacturing meet customer needs and stay consistent with their goals and values? How do organizations make trade-off decisions with respect to quality, cost, and time? Operations Management provides tools and methods to optimally answer these questions in a global business world.

Operations managers are primarily concerned with the design, procurement, production, and delivery of goods and services. They are responsible for the systematic planning, designing, operating, controlling and improving the various procurement, production, storage, and shipping processes involved from the time the product or service is designed till customer delivery occurs. The challenge for operations managers is to produce goods and services and deliver them in an efficient manner and in accordance with the business strategy of their company. Typically, this involves balancing the needs for satisfying customer demand, on-time delivery, lower costs, and higher quality.

In this course you will learn the fundamentals of Operations Management, enhance your managerial insight and intuition, and improve your business decisions.

More specifically, we will investigate the following aspects of Operations Management to practice decision-making skills:

- Process Analysis and Capacity Management.
- Optimization and Linear Programming.
- Managing Uncertainty.
- Forecasting.
- Revenue Management.
- Inventory Management and Supply Chain Coordination.
- Project Management.

This will be accomplished through: (i) understanding of the business environment and the structure of important operational problems; (ii) analysis of the relevant principles, issues, and trade-offs; and (iii) working knowledge of relevant methodological tools, solution procedures, and guidelines.

Prerequisites

Students are expected to know the basic concepts of Probability and Statistics. In addition, every student is assumed to have access to and be able to use regularly, efficiently and effectively a word processor, e-mail, a web browser and a spreadsheet software package.

Textbook

The required textbook for this course is: F. Robert Jacobs, Richard B. Chase, and Nicholas J. Aquilano, ***Operations and Supply Management***, 12th edition, McGraw-Hill/Irwin, 2008. You are also required to buy the case and reading booklet from the bookstore.

Instructional Methods

The classes will consist of lectures, discussions, and case studies analyses and presentations. The cases will be analyzed and presented in teams. Teams should be formed by the beginning of the second class. Each team will consist of 4-5 students.

During the course we will analyze 5 cases studies. Each team will present in class the analysis of one case, (note that two or more teams may present the same case), and each team will submit a written analysis of the case (no more than five pages long). **All students must be ready for the discussion of all cases**.

Students must complete the assigned readings and homework assignments prior to coming to class. **Homework assignments will not be accepted after the start of the class.**

Grading

The course grade, which will be curved, is based on two midterms, a cumulative final exam, in-class quizzes (there will be three quizzes, but only the best two will count towards the course grade), homework (there will be seven homework assignments, but only the best six will count towards the course grade), case studies, and a computer game simulating a laboratory, and attendance according to the following weights:

Participation/Attendance	5%
Quizzes	5%
Homework	10%
Case analysis, presentation, and write-up	5%
Laboratory Simulation Game	10%
Exam 1	15%
Exam 2	15%
Final Exam	35%

All tests are open books/notes. **No make-up tests or quizzes are offered** – accordingly, all quizzes must be taken on their assigned date and in the section in which students are registered. **Students are not allowed to attend other sections – and attendance will be called randomly throughout the semester**. The deadline for all grade corrections is December 5, 2008.

The computer game is a competitive web-based factory simulation (http://www.responsive.net) by Littlefield Technologies. It consists of two assignments, each lasting seven days. In each assignment student teams will compete to make the most money by managing a factory. The first simulation game focuses on capacity management in an environment with growing demand. The second simulation game focuses on lead time and inventory management. Every student must **purchase** a Littlefield Technologies **Access Code from the bookstore** before **September 26, 2008**. Students must form teams (same team that are used for the case analysis and presentation) and register their teams according to the instructions that are printed with the Access Code. In addition to the Access Code, you need the following course code to register: **usc**.

Notice on Academic Integrity

The use of unauthorized material, communication with fellow students during an examination, attempting to benefit from the work of another student, and similar behavior that defeats the intent of an examination or other class work is unacceptable to the University. It is often difficult to distinguish between a culpable act and inadvertent behavior resulting from the nervous tensions accompanying examinations. Where a clear violation has occurred, however, the instructor may disqualify the student's work as unacceptable and assign a failing mark on the paper. There may be additional penalties, including failing the course, in accordance to the university policies, as listed in the SCampus.

For Students with Disabilities

Any student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to your instructor as early in the semester as possible. DSP is located in STU 301 and is open 8:30 a.m. - 5:00 p.m., Monday through Friday. The phone number for DSP is (213) 740-0776.

Course Disclaimer

This syllabus is an invitation to students to engage in an exciting and interactive study of operations management. The intention of the BUAD 311 team of instructors is to provide you with information, offer practice with skill sets, and enhance your capacity to use fundamental concepts to build your repertoire of operating strategies and make sound decisions. The learning environment will be collaborative and supportive; we will learn from one another both in and out of the classroom. To that end, modifications to this syllabus might be warranted as determined by the instructors as we assess the learning needs of this particular class of students.

COURSE OUTLINE

Module 1: Process Analysis and Capacity Management

Session 1 - 8/26/08 (Tuesday): Introduction to Operations Management and Process Analysis
Question: What is Operations Management? Why Operations Management?
Learning Outcomes: The purpose of this lesson is to introduce Operations Management (OM) to you. You and your classmates will discover that OM is everywhere and that a study in OM prepares you to make sound business decisions by assessing trade-offs and identifying improvements.

- Define and recognize Operations Management in real-world situations
- Construct and read processes using flow chart diagrams
- Understand the potential trade-offs in make-to-stock and make-to-order processes
- Identify different forms of risk pooling

Text Reading: Chapter 1: pp. 2-8, Chapter 6: pp. 158-168

Session 2 - 8/28/08 (Thursday): Business Process Management
Question: What does the life of an operations manager/consultant look like?
Learning Outcomes: In this class, you will participate in an IBM game that exposes you to operations management in a company during the course of a day. The game enhances your operation management experience and gives you practice in flow chart diagrams.

- Present business processes using flow chart diagrams
- Experience the overarching philosophy of operations management and its decision-making process

Session 3 - 9/2/08 (Tuesday) : Measures: Capacity, Time, and More
Question: How do we quantify the performance of a process? What is Little's Law?
Learning Outcomes: The flow of customers or products into and out of a system determines process efficiency and ultimately the bottom line. You will learn a powerful formula to help you better understand the performance of the business processes.

- Define capacity and utilization rate
- Understand that a bottleneck governs the process capacity
- Evaluate process performance using Little's Law

Text Reading: Chapter 6: pp. 168-172
Teaching Note: Process Analysis

Session 4 - 9/4/08 (Thursday) : ***The Kristen's Cookie Company (textbook pp.184),*** More on Capacity Management
Question: What is the makeup of a small cookie business? How do we determine capacity requirements?
Learning Outcomes: Through this case, you will gain a better understanding of the business profitability through business process practices, evaluate key performance measures, and realize your decision's effects on bottom line. After the case, we will also examine factors that determine the capacity planning of a business.

- Learn the fundamental capacity requirement calculation
- Understand the impact of flexibility on capacity requirement
- Understand the impact of inventory on capacity requirement

Case Preparation Questions:

1. *Draw a process flow diagram for Kristen's Cookies.*
2. *How quickly can you fill a rush order?*
3. *How many orders can you fill in a night, assuming you are open four hours each night?*
4. *How much of your own and your roommate's valuable time will it take to fill each order?*
5. *Because your baking trays can hold exactly one dozen cookies, you will produce and sell cookies by the dozen. Should you give any discount for people who order two-dozen cookies, three-dozen cookies, or more?*
6. *Are there any changes you can make in your production plans that will allow you to make better cookies or more cookies in less time or at lower cost?*

Text Reading: Chapter 5: pp. 120-129, 133-135

Module 2: Optimization and Linear Programming

Session 5 - 9/9/08 (Tuesday) : Introduction to Linear Programming
Question: How do we find the optimal solution? What is a linear program?
Learning Outcomes: Optimization gives business a critical edge. In this class, you will learn that optimization is a powerful tool that can be applied to various business problems not limited to operations management. You will be able to formulate a linear program (LP) and solve small LP problem graphically.

- Recognize linear program as a special optimization tool
- Understand the components of a linear program
- Formulate linear programs
- Present and solve small LPs graphically
- Make decisions utilizing optimization to allocate resources effectively

Text Reading: Chapter 2A: pp. 36-41
Teaching Note: Linear Programming
Due HW # 1: Process Analysis

Session 6 - 9/11/08 (Thursday) : Using Excel to Solve Linear Programs
Question: How do we use Excel to solve linear programs?
Learning Outcomes: Solver in Excel will be introduced to you. You will practice linear program formulation setup in Excel and solve formulations using Solver. You will appreciate the value of the Excel reports, which help you understand how the solutions change if the conditions vary.

- Setup spreadsheet for linear programs
- Solve linear program using Solver
- Interpret the Excel reports

Text Reading: Chapter 2A: pp. 41-44
Quiz #1

Session 7 - 9/16/08 (Tuesday) : ***Timeshare Exchange Fair (Case is in the booklet)***
Question: How can we build a successful timeshare exchange business? What is the "optimal" exchange schedule?
Learning Outcomes: In this case, you will transform a business challenge into a mathematical model with your choice of decision variables and objective function. Not only you will build a model, you will also interpret your conclusions.
Case Preparation Questions:

1. *Develop a mathematical programming approach for determining an optimal exchange schedule. How will you choose your objective function?*
2. *Download the data from Tables 1 and 2 in the case, and solve the simplified exchange problem using your approach.*
3. *Please advise Wall as to how to quantify these opportunity costs. How big are these costs in the data sample from Table 1? Comment on the short- and long-term benefits or losses from allowing or forbidding downgrade and upgrade requests.*
4. *How will Gold owners affect your model?*

Session 8 - 9/18/08 (Thursday): Exam #1 Review
Due HW # 2: Linear Programming

Session 9 - 9/23/08 (Tuesday): Exam #1

Module 3: Managing Uncertainty

Session 10 - 9/25/08 (Thursday): Review of Basic Probability and Statistics
Question: How do we characterize uncertain events? How do probability and statistical concepts and tools help us understand uncertainty?
Learning Outcomes: We live with uncertainty in an uncertain world from weather reports to business practices. The scientific language that describes uncertainty is crucial to business decision-making. You will be reacquainted with this language and be ready for decision-making in an uncertain world.

- Refresh your understanding of concepts such as random variable and distribution
- Reacquaint yourself with the language of probability and statistics (expectation, variance, variability)
- Review and practice basic formulas and common distribution functions that are widely used

Teaching Note: Variability and Queues

Session 11 - 9/30/08 (Tuesday) : Waiting Lines: Understanding Rules and Principles
Question: How is waiting experienced as a psychological phenomenon? What rules and non-formulaic principles can support us in understanding and managing wait lines or queues to optimize performance and revenues?
Learning Outcomes: We wait. Understanding *waiting* as a phenomenon and *queuing* as theory and process enables us to create schedules, monitor inventory, analyze service, and determine a cost-effective balance for optimal performance and revenues. In this class, you will build a core understanding of three important factors pertaining to the performance of the wait lines.

- Recognize the psychology of waiting-lines
- Understand variability and its impact on the waiting performance
- Review utilization rate and its effect on waiting performance
- Identify the risk pooling effect in the waiting line systems

Text Reading: Chapter 8A: pp. 276-285
Article Reading: "The Psychology of Waiting-lines" David H. Maister. HBS Case, 1984 (Article is in the booklet)

Session 12 - 10/2/08 (Thursday): Waiting Lines: Waiting Line Classifications and Formulas
Question: What are the important factors that can help us quantify the waiting time? How can mathematical calculations support our decision-making for optimal performance and revenues?
Learning Outcomes: We wait. What does waiting look like when we translate real life into variables for use in formulas and mathematical calculations to determine expected waiting time?

- Identify classifications for different kinds of waiting systems
- Present formulas for various waiting systems to quantify waiting time
- Practice solving for average waiting time using formulas
- Reexamine waiting lines principles using formulas

Text Reading: Chapter 8A: pp. 285-296

Session 13 - 10/7/08 (Tuesday) : ***West Coast University Student Health Services: Primary Care Clinic (Case is in the booklet)***
Question: With a given number of physicians, how can we best serve patients most efficiently and with minimal wait time? How do we leverage the risk pooling effect?
Learning Outcomes: Today's lesson involves us in problem-centered learning. Putting theory and skills to practice, we will engage with a case to deepen our understanding of how to manage capacity in a real world scenario. You will need to sort through extensive case information, gain experience as a member of team to solve a management capacity problem, and practice with risk pooling, variability, and utilization rate concepts and formulas.
Case preparation questions:

1. *In Joan Carvin's mind what are main problems that the Health services are facing? Do you agree with Joan? Explain your answer in detail.*
2. *What are the potential solutions to the problems? First explain Joan Carvin's solutions, and the advantages and disadvantages of the proposed solution. Then explain your suggested solution in case you have one.*
3. *How would you measure the success of a solution? What are the measures you would use? Explain your answer.*
4. *Assuming the solution suggested by Dr. Carvin, how would you construct the teams? How many Physicians and How many NP should be in each team? In you analysis you may assume that all physician and NP are preferred, more or less, by the same number of students. Also, in your analysis, you may make any reasonable assumptions. You must state these assumptions very clearly.*

If you have a solution that is different than Dr Carvin's solution then explain the advantages of you solution. Support you analysis by facts and analysis.

Session 14 - 10/9/08 (Thursday): Simulation
Question: How can computers help us manage uncertainty?
Learning Outcomes: Absent a formula which would give us a single number for making decisions and managing uncertainty, today's lesson will involve us in an assignment whereby we determine a range or confidence interval to guide our decision-making.

- Simulate waiting lines
- Simulate portfolio and project development management
- Appreciate the value of distributions and become acquainted with the concept of confidence interval

Text Reading: Chapter 19A: pp. 652-667
Due HW # 3: Managing Uncertainty

Module 4: Forecasting

Session 15 - 10/14/08 (Tuesday) : Introduction to Forecasting
Question: What makes a good forecast?
Learning Outcomes: Anticipating the future is no easy task. From astrologers to business managers, we try as best we can to use science and mathematics to demystify the unknown for optimal decision-making. Finance and marketing as well as production and service rely on forecasting to make both long-term and short-term management decisions. You will learn the methods basic to forecasting, become skilled at calculating measurement error, and understand the trade-off between responsiveness and stability in parametric selection.

- Define basic concepts of forecasting
- Understand how to measure forecast error of a forecast method
- Apply the simple moving average model
- Apply the exponential smoothing method

Text Reading: Chapter 15: pp. 466-483
Quiz #2

Session 16 - 10/16/08 (Thursday): Forecast with Trend and Seasonality
Question: How do we forecast in environments with trend and seasonal characteristics?
Learning Outcomes: You will practice the exponential smoothing method and learn how to make adjustments in forecasting for trend and seasonal effects by adding more parameters.

- Identify the risk pooling effect in forecasting
- Practice the double exponential smoothing method for trend forecast
- Learn the Holt-Winter's Season Algorithm (i.e. triple exponential smoothing method) for seasonal forecasting

Text Reading: Chapter 15: pp. 487-490

Module 5: Revenue Management

Session 17 - 10/21/08 (Tuesday) : Introduction to Revenue Management and Decision Trees
Question: How can we optimize our decision in an uncertain world? What is a Decision Tree? How can it be used as a tool to manage and increase revenue?
Learning Outcomes: The Decision Tree is a schematic model used to manage uncertainty by clearly identifying choices and alternative choices. You will learn how to construct a decision tree --- i.e., its nodes and branches and solve the optimal decision by studying a capacity investment problem.

- Learn to draw a decision tree and distinguish the two types of the nodes
- Practice solving decision trees
- Appreciate the value of delaying decisions to collect information

Text Reading: Chapter 5: pp. 130-132

First Simulation Game Starts at 10/23/08 7:00pm

Session 18 - 10/23/08 (Thursday): Revenue Management Tools
Question: How many classes should the airline offer? What price should an airline charge to increase revenue? And how many seats should an airline sell for each class?
Learning Outcomes: You've purchased airline tickets and experience variability in ticket prices. You've probably also been offered a greater sum of money and additional awards to buy-back your ticket at the gate for overbooked flights. In this lesson, we will learn tools to control capacity and manage revenues more effectively.

- Appreciate the history of revenue management as "invented" by airline carriers after deregulation
- Become acquainted with the revenue management tools: marketing segmentation, overbooking, and capacity control.
- Identify the elements and trade-offs of basic revenue management
- Utilize a decision tree to more effectively solve for these types of problems

Teaching Note: Yield Management
Due HW # 4: Forecasting

Session 19 - 10/28/08 (Tuesday): Guest Lecture
Question: What are the operations management challenges faced by practitioners? What are their daily tasks?
Learning Outcomes: In this class, operation practitioners will expose you to the challenges and tasks they face. The competitiveness of a company is determined by their multi-year planning and daily execution.

First Simulation Game Ends at 10/30/08 7:00pm

Session 20 - 10/30/08 (Thursday): Exam # 2 Review
Due HW # 5: Revenue Management

Session 21 - 11/4/08 (Tuesday) / 11/5/08 (Wednesday): Exam #2

Module 6: Inventory Management and Supply Chain Coordination

Session 22 - 11/6/08 (Thursday): Economies of Scale
Question: Why carry inventories? What is "economies of scale"? How can we minimize costs?
Learning Outcomes: Inventory is essential for business activities though it can be costly. You will examine the trade-off between economies of scale and inventory cost and learn how to find the right amount of inventory using the economic order quantity (EOQ) formula.

- Discuss the phenomena of economies of scale
- Identify the elements and trade-offs of basic inventory problem
- Practice using the EOQ formula to minimize cost

Text Readings: Chapter 17: pp. 544-549, 555-558

Session 23 - 11/11/08 (Tuesday): Demand Uncertainty
Question: Why carry inventories? How to guarantee customer satisfaction with minimum inventory?
Learning Outcomes: Inventory is a necessary evil especially when you face demand uncertainty. You will learn a reasoning method called marginal analysis. You will examine the trade-off between more and less inventories and solve the problem optimally via a decision tree.

- Identify the elements and trade-offs of basic inventory problem
- Practice marginal analysis and solve using a decision tree
- Examine the risk pooling effect in inventory systems

Text Readings: Chapter 17: pp. 551-553
Teaching Note: Inventory Management
Due First Simulation Game Report

Session 24 - 11/13/08 (Thursday): Pulling It Together: Economies of Scale & Demand Uncertainty
Question: What does the real life inventory policy look like? When and how many should we reorder?
Learning Outcomes: Various real life inventory systems are presented. The optimal policy is built on the same trade-offs you learned in the previous classes. Today's class will help you play the simulation game.

- Learn different kinds of inventory systems
- Understand the concept of lead-time and safety stock
- Identify the trade-offs in a real-life inventory system

Text Readings: Chapter 17: pp. 553-555, 558-567

Second Simulation Game Starts at 11/18/08 7:00pm

Session 25 - 11/18/08 (Tuesday): Supply Chain Coordination and Beer Game
Question: What is a supply chain? How do our decisions influence others' decision?
Learning Outcomes: The success of a company may rely on its upstream supplier and its downstream distribution. Incentive and information are two crucial factors in decision making. You will learn the buy-back contract that aligns different players' incentives. You will also play the beer game, which demonstrates the information distortion in a supply chain.

- Understand the concepts of supply chain and supply chain coordination
- Identify buy-back and revenue sharing contracts that coordinate the supply chain
- Experience the bull-whip effect via the beer game

Text Readings: Chapter 10: pp. 356-370
Article Reading: "Back to the Future: Benetton Transforms its Global Network" Arnaldo Camuffo, Pietro Romano, and Andrea Vinelli. MIT Sloan Management Review, 2001(Article is in the booklet).

Session 26 - 11/20/08 (Thursday): ***Zara Case Study (Case will be posted in Blackboard)***
Question: Have you been to a Zara store? How does Zara manage its inventory and supply chain?
Learning Outcomes: The fashion business is demanding on inventory management because leftovers get significant markdowns. You will study Zara's supply chain structure and its inventory policy and examine how its operation strategy aligns with its business strategy.
Case preparation questions:

1. *What makes Zara different from other specialty apparel retailers?*
2. *Where are competitive threats to Zara likely to come from?*
3. *What should Zara's approach be to determining its sourcing mix? What factual assumptions are you making when you reach your conclusions?*
4. *How sustainable would you calibrate Zara's competitive advantage as being relative to the kinds of advantages typically pursued by other retailers?*

Second Simulation Game Ends at 11/25/08 7:00pm

<u>Module 7: Project Management</u>

Session 27 - 11/25/08 (Tuesday): Introduction to Project Management
Question: What is a project? When can we complete it?
Learning Outcomes: As changing becomes a standard part of business life, project management becomes more and more important because projects enable change. You will learn the basics of project network presentations and project scheduling techniques.

- Learn the AON and AOA network presentation for project tasks and their relationship
- Practice the critical path method for project schedule
- Practice the PERT method for project schedule
- Discuss the criticism associated with these techniques

Text Readings: Chapter 3: pp. 65-72
Due HW # 6: Inventory management

Session 28 -12/2/08 (Tuesday): ***Dragonfly: Developing a Proposal for an Uninhabited Aerial Vehicle (UAV) (Case is in the booklet)***
Question: What are the tasks in developing a UAV? How should we complete it?
Learning Outcomes: Project managers need to manage project scope, time, and cost. They need to foresee uncertainties and risks. In this case, you will practice various tools you have learned and to develop sound project schedules.
Case preparation questions:

1. *How could Bob Lake formally represent the evolution of the project, showing interdependence and parallelism among activities? What was the expected completion time of the project? Assume first that the interdependence among activities A4 and A9 does not exist. Then consider how the interdependence changes the answer*
2. *Should any activities be shortened to ensure timely completion of the proposal, and is so, which ones? How does uncertainty in the task completion times affect project completion and the shortening of task times? What is the expected cost of the proposal?*

Due Second Simulation Game Report
Quiz #3

Session 29 - 12/4/08 (Thursday): Final Review
Due HW # 7: Project management