

# EPMBA 715 - OPERATIONS MANAGEMENT

## Fall 2004

### Profs. Mefford and Huxley

(May be revised during course based on class progress.)

Email: [mefford@usfca.edu](mailto:mefford@usfca.edu) [huxleys@usfca.edu](mailto:huxleys@usfca.edu) (Huxley website:  
[www.usfca.edu/~huxleys](http://www.usfca.edu/~huxleys))

Phone: 415-422-6408 415-422-6628

Fax: 415-422-2502 Same

#### Learning Goals:

Getting the "right mix of clicks and bricks" is a primary problem facing both old and new companies. The fundamentals of operating a supply chain have not changed, as the demise of dot-coms who failed to understand this demonstrates. Any managers who want to be a serious contender on the competitive field – with or without an MBA - should know about these fundamentals and their solutions. EPMBA 715 is designed to cover a number of the fundamentals.

Tardy deliveries, undependable service, defective products, and high costs are the operational problems faced by most companies, whether providing goods or services. Continuous improvement in business can often be accomplished using the concepts and tools of modern production management including JIT/lean production and TQM/Six Sigma quality management. Some of the management science tools you will learn in this course are optimization using linear programming, statistical quality control, and PERT/CPM project scheduling.

The focus of the class will be on quality, productivity, and scheduling. These are the day-to-day challenges confronting any organization. Knowledge of operational concepts and tools, when used in conjunction with common sense, will help improve your performance and effectiveness so that you can grow and thrive in whatever you do. You can command better from the heights when you know what must be done in the trenches.

#### Main learning objective:

To be able to make effective operational and strategic decisions using concepts, methods, and quantitative tools from the field of operations management.

#### Secondary learning objectives:

1. Be able to recognize common problems in managing operations
2. Become exposed to classic tools and techniques used to analyze and solve operational problems.
3. Understand the logic and premises upon which the tools are based
4. Know where to find further information about operations management
5. Know enough theory to evolve as the current generation of tools is replaced by the next

## TEXT AND MATERIALS:

### 1. REQUIRED:

a) *Production and Operations Management*, 10th Edition, by **Chase**, Aquilano, and Jacobs, Irwin (2004). To get the most out of the course, we recommend you skim (or study if you have the time) the relevant chapters before the lecture. If this is not possible, you should use the text as a reference after the lectures. The text, considered best in the field, comes with a CD-ROM that features video clips, industrial web sites, solved problems from the text, demo packages for software, etc. Installation instructions are provided on the disk. Most of the websites are still active, and you should find this feature of the text a refreshing change from me. The CD-ROM does not contain much technical information; its purpose is simply to enrich the class. Text support can be found at [http://highered.mcgraw-hill.com/sites/0072506369/information\\_center\\_view0/](http://highered.mcgraw-hill.com/sites/0072506369/information_center_view0/)

b) *Plant and Service Tours in Operations Management*, 5th Edition, by Roger W. **Schmenner**, Prentice Hall (1998). A book of readings covering typical operational issues faced by ten different types of industrial and service facilities.

c) **LECTURE NOTES** by S.J. Huxley. You should bring these NOTES to class for the sessions where Huxley is instructing..

d) Materials to be distributed in class: These include readings, cases (both written and in-class), and assignments.

e) Familiarity with spreadsheet technology. Excel's Solver feature allows for nonlinear as well as linear programming, which makes it a powerful tool for textbook problems. A weakness, however, is that it cannot solve real world problems that are too large for it the standard package (e.g. over a 100 variables and constraints). Additional software is available to extend its capacity for those who wish to pursue Excel as the tool of choice.

f) Familiarity with the internet. Conventional wisdom holds that most people do not understand the technical aspects of quality and productivity, and websites are visited primarily by the professionals in the field (and students who have progressive instructors). By visiting the sites listed below as part of this class, you will hopefully be able to maintain a link to this area of expertise forever. In addition to those listed on the Chase CD-ROM, we highly recommend the following:

#### 1. American Production and Inventory Control Society (APICS):

<http://www.apics.org/>

#### 2. American Society for Quality (ASQ). (Oldest and largest organization related to quality in the world):

<http://www.asq.org/>

#### 3. Institute For Operations Research and Management Science (INFORMS):

<http://www.informs.org/>

#### 4. Net-Enabled Optimization System (NEOS):

<http://www.mcs.anl.gov/home/otc/>

#### 5. Data Envelopment Analysis -

1) DEA Home Page: <http://www.deazone.com/index.htm>

2) Banxia (developers of Frontier Analyst): <http://www.banxia.com>

**6. Review of supply chain websites:**

- 1) [http://www.usfca.edu/~huxleys/SCM\\_Rose.doc](http://www.usfca.edu/~huxleys/SCM_Rose.doc)
- 2) [http://www.usfca.edu/~huxleys/SCM\\_Fuchs.doc](http://www.usfca.edu/~huxleys/SCM_Fuchs.doc)
- 3) <http://www.manufacturing.net/scl/>

**7. The publishers of the text have an Operations Management Center:**

<http://www.mhhe.com/business/opsci/pom/>

(This site contains a remarkably rich variety of operations management resources – plant tours, special company web sites, etc.)

2. **OPTIONAL:** For those who wish more materials after the course:

a) *The Goal*, a book by Eliyahu M. Goldratt, North River Press (1992). This paperback has become somewhat a classic in operations literature. It incorporates a personal story of a plant manager struggling with scheduling and other operational issues in running his plant. Divorce, corporate politics, and operations management, all become part of the story - somewhat amateurish but tolerable. The author is a guru in plant scheduling and developed a very successful consulting practice using the "Theory of Constraints" (TOC), based on LP applications in real world plants (<http://www.goldratt.com>). Annual conferences are now held on this topic alone. To find it at Amazon.com:

<http://www.amazon.com/exec/obidos/ASIN/0884270610/o/qid=919222273/sr=2-1/002-1811992-9728454>

b) *QSB for Windows*, software by Chang and Sullivan (1997). QSB (Quantitative Systems for Business) includes about 20 different operations management programs. A good buy for those who may want to have access to these techniques beyond what Excel can provide. I could not justify ordering it for everyone and the advent of NEOS and similar services on the internet may ultimately render this type of software obsolete, but certainly worth consideration for engineers and like-minded types if you enjoy the material in this course. To find it at Amazon.com:

<http://www.amazon.com/exec/obidos/ASIN/0471173436/o/qid=919222514/sr=2-1/002-1811992-9728454>

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**Summary of Class Dates and Topics:**

1 Wed. Sept. 15 Quality Management – TQM/Classic Tools/Six Sigma/SQC (Mefford and Huxley)

2 Fri. Sept. 24 Optimization and Classic Applications (Huxley) [Skill #1 and Case #1 due.]

3 Sat. Sept. 25 pm Optimization Applications (cont.)/MRP/JIT (Mefford and Huxley) [Skill #2 due via email by 10PM Monday, Oct. 4]

4 Sat. Oct. 9 pm Planning, Scheduling, and Sequencing Operations and Project Management (Mefford and Huxley) [Skill #3 due]

5 Wed. Oct. 13 Supply Chain Management (Mefford)

6 Sat. Oct. 23 pm Global Operations and Operations Strategy (Mefford) [Skill #4 and Case #2 due]

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## TOPICAL OUTLINE:

The topics to be covered each session are outlined below. The plan for each session indicates two time frames:

**During This Session** indicates what we plan to cover during the session. Always be prepared for the session by having read any readings and assigned chapters from Chase, et al.

**After This Session** indicates what you should do as soon as possible to follow up on the material covered, such as solving relevant practice problems, reviewing the text to fill in any questions you may have, etc.

The term Chase: 1, 2 refers to Chase, Aquilano, and Jacobs, Chapters 1, and 2. There is an extensive collection of video clips on the CD ROM that comes with the text. We suggest you view the relevant clips for the relevant chapters each week. The Lecture Notes contain practice problems in the back with solutions worked out in full; you should work these out on your own after the relevant material has been covered in class. Schmenner refers to the *Plant Tours* book. Readings in Schmenner are designed to supplement the material in the course to provide examples of how the tools are used in the real world.

### **Session Date TOPICS (References)**

1 9/15 Wed. Quality Mgt. – Strategic Issues/Classic Tools/ Six Sigma/SQC (Huxley & Mefford)

**DURING THIS SESSION: Video – Statistical Quality Control**

1. Overview of the course
2. The planned lecture will cover material in the Lecture Notes, Module12 and in Chase, Chap. 7 including the Technical Note on SQC.

**AFTER THIS SESSION:**

1. Read in Lecture notes: 1) “Six Sigma Quality Programs” p. 189.1-189.6, 2) “Making Things Right” p. 189.7-189.10.
2. Read Schmenner – Tour E (Stroh’s Brewery), Tour F (Burger King)
3. Internet: Scan the websites for the American Production and Inventory Control Society ([www.apics.org](http://www.apics.org)) and the American Quality Society (<http://www.asq.org/>)
4. Deliverable: Skill Exercise #1 (to be done individually): Due via email by 5PM, Sept 24
  - Part A. Read Chapter 10 from Middleton’s “Data Analysis using Microsoft Excel” and replicate his examples to get Figures 10.7 and 10.10.
  - Part B. In the Stroh’s Brewery article, page 130 lists the specification for yeast cells per millimeter of beer. If the standard deviation of the process is 0.775 million yeast cells (based on past inspections), about what percentage of the time will the sample fail to meet the yeast standard? The process standard deviation must be reduced to what value if the firm is to achieve the “Six Sigma” level of quality so that the sample fails no more than 3.4 times out of a million?
5. Deliverable: case on quality management (to be distributed in class). Due on hard copy by the beginning of class on Sept 25.

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## **2 9/24 Fri. Optimization and Classic Applications (Huxley)**

### **DURING THIS SESSION:**

**Due before 5PM – Skill Exercise #1 via email to Huxley.**

### **Video—Linear Programming**

- 1. Lecture Notes Module 1 - Introduction to the primary tools of optimization:  
Constrained Optimization: Goal seek, Linear and Nonlinear Programming  
Classic Applications - Staff Scheduling and Data Envelopment Analysis  
Unconstrained Optimization: Calculus (time permitting)**

### **AFTER THIS SESSION:**

- 1. Optional: Review Chase to supplement the lecture material as needed: skim Chapters 1, 2 and review Supplement A (p. 702) on LP as needed. Skim means read the section headings, look at the photos, tables, and charts, read the conclusion at the end of the chapter, and use the text as a reference resource to help better understand questions you may have that were unanswered in class.**
- 2. Optional - Do practice exercises in the back of the LECTURE NOTES (solutions are given several pages thereafter for all practice problems):  
Practice Set 1: Baby LP's: 1, 3, 5, 6, 7 pages 203-205, and 10, 13, 15, pages 217-218.  
Practice Set 2: Problems 1-9, pages 302-306.  
Practice Set 3: Personnel - Problems 8-10, p. 351**
- 3. Complete and email to Huxley Skill Exercise #2 by 10PM Monday, Oct. 4 (to be done individually):  
Part A. Use Solver to solve Baby LP's 2, 4, and 8 in the Lecture Notes, p.203-205.  
Part B. To be distributed.**
- 4. Read Schmenner - Tour H (Lazarus)**
- 5. Internet: Scan the web sites related to optimization:  
<http://www.mcs.anl.gov/home/otc/> , <http://www.informs.org/>**

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## **3 9/25 Sat PM Optimization Applications (cont.)/MRP/JIT (Huxley & Mefford)**

### **DURING THIS SESSION:**

- 1. DUE by 1PM on hard copy: Case study #1 on TQM**
- 2. The planned lecture will cover material in the Lecture Notes, Module 2 and in Chase, Chap. 11 & 15**

### **AFTER THIS SESSION:**

- 1. Deliverable: Skill Exercise #3 (Group) - Handout problems on Linear Programming. These will take some time, so do not wait to get started.**
- 2. Review Chase to supplement the lecture material as needed.**
- 3. Read Schmenner - Tour G (Ogle-Tucker Buick), Tour D(Carrier Corp.)**
- 4. (Optional) Review the web sites related to DEA:  
1) DEA background: <http://www.emp.pdx.edu/dea/homedea.html>  
2) DEA Home Page: <http://www.deazone.com/index.htm>  
3) Banxia (developers of Frontier Analyst): <http://www.banxia.com>**

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#### **4 10/9 Sat PM Planning, Scheduling, and Sequencing Production/Project Management**

**(Huxley & Mefford)**

**DURING THIS SESSION:**

1. **DUE before class via email to Huxley: Skill Exercise #3 (Group)**
2. **The planned lecture will cover the material given in the Lecture Notes, Modules 7, 8 and Chase, Chap. 3, 10, 13, & 16**

**AFTER THIS SESSION:**

1. **Do the practice exercises in the back of the Lecture Notes relating to the material covered in this session:**

Practice Set 4:     **Production Planning: Problems 1-4, P. 347-349**  
                              **Processes - Problems 5-7, 11-13 (Optional - #14), p. 350, p.352-354**

2. **Read Schmenner: Tour B (Norcen Industries), Tour J (Geupal DeMars)**
3. **Internet: Scan the web site for the American Production and Inventory Control Society: <http://www.apics.org/>**
4. **Deliverable: Skill Exercise #4 and email to Huxley by 10PM Sunday, October 24 (to be done individually): Handout problems on Sequencing and Scheduling**

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#### **5 10/13 Wed. Supply Chain Management (Mefford)**

**DURING THIS SESSION:**

1. **Read Chase Chapters 9 & 14**

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#### **6 10/23 Sat. PM Global Production and Operations Strategy (Mefford)**

**DURING THIS SESSION:**

1. **Read Chase Chapters 2 & 8**
2. **Turn in PERT/CPM assignment**

**DUE by 10PM Oct. 24: Skill Exercise #4 via email to Huxley.**

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#### **POLICIES AND PROCEDURES:**

**A. Assessment: four skill exercises plus two cases.**

|                    |                                      |
|--------------------|--------------------------------------|
| Skill Exercise #1  | – 10% (to be done individually)      |
| Skill Exercise #2  | – 10% (to be done individually)      |
| Skill Exercise #3  | – 20% (to be done with normal group) |
| Skill Exercise #4  | – 10% (to be done individually)      |
| Case #1 (TQM)      | – 25% (to be done with normal group) |
| Case #2 (PERT/CPM) | – 25% (to be done individually)      |
|                    | 100%                                 |

In awarding grades, A's go to those who score 90 percent or more and B's to those who score in the 80- 90 percent range. As graduate students, you should realize that grades are not nearly as important as what you truly learn and apply.

**B. Out of Class Assignments:** Please email the skills exercises to Prof. Huxley according to the instructions below, and submit hardcopy of the quality and project management cases to Prof. Mefford. “Group” means your normal group arrangements. "Individual" means you should complete the homework by yourself, but you are allowed to seek help from others provided you not simply photocopy or duplicate someone else's work. Each of you should be able to accomplish the tasks on these assignments on your own by the time you turn them in. As always, the educational value of the class is of paramount importance. We will trust each of you to guard the educational process by helping others only by taking time to instruct them, not simply giving them the answers. Each person will receive equal credit for the group work unless we are notified otherwise.

**Instructions for Emailing Homework – Please follow closely. If you have any questions, please ask me.**

1. The skill exercises must be emailed to Huxley **by the times listed above**. Late homework will be eligible for only half credit if turned in within one week after the due date. Because computers and email traffic is sensitive to small errors, you **must** follow the rest of these instructions precisely to be eligible for credit. Send it to: [huxleyhomework@usfca.edu](mailto:huxleyhomework@usfca.edu) and send a copy to yourself to prove you sent it on time in case there is a problem.

2. In the email **Subject** line, indicate the course, section, homework number, and name. For example, John Smith, SID number 12345, is enrolled in EP MBA 715 Operations Management, is emailing the **first** Excel homework. In his email, he would put

**Subject: 715HW1smitjo.xls**

3. Attach the file using the same name as the subject line. For John Smith, this would be **Attachment file name: 715HW1smitjo.xls**

4. In cell A1 on the first sheet (or ‘tab’ or ‘ply’) of the homework, type the same file name again. In cell A2, type your real name in full, in A3, your SID, and in A4, the homework number. John Smith would type:

|          |                  |
|----------|------------------|
|          | <b>A</b>         |
| <b>1</b> | 715HW1smitjo.xls |
| <b>2</b> | John Smith       |
| <b>3</b> | 12345            |
| <b>4</b> | Homework 1       |

5. When doing your homework, put each problem on a **separate** sheet (or ‘tab’ or ‘ply’) within the same workbook. Put the identification information on the first sheet, then problem 2 on the second sheet, etc. For example, for Homework 1, the second sheet’s tab should be renamed from “Sheet 1” to “Grippe Gloves.” (Right click on the tab for the ‘Rename’ command; you can also insert new sheets with the right click as needed.) When you save the file, save it so that the appropriate figure is the first thing a person sees when viewing that sheet (to go the Cell A1 quickly, use Control Home on your keyboard). If you do not complete a particular problem, you should still rename the tab and type ‘Not Done’ in Cell A1.

6. Save all the work assigned for the homework in a single Excel file and send it only once. Homework sent in bits and pieces cannot be given any credit. Your submission will be opened only once, and only the first one received will count, so do not send it until it is completely ready and all parts are finished. (Put yourself in the place of the grader – opening many files and searching for randomly placed material is a nuisance and waste of time.)

**C. Attendance:** Since much of the course material is presented through the class sessions, attendance is essential to realize the education value of this course. Also as you undoubtedly have realized by now, there is significant learning available from other members of your cohort that is realized through class discussions. This is particularly relevant in this course since every manager performs some operational functions and should be able to relate to the topics presented in the course.

**D. Academic Dishonesty:** One of the advantages we assume that comes from teaching in this program is that academic dishonesty will not be a problem. Anyone having difficulties should contact us privately. There is no need to violate ethical standards - education is our primary goal here, not grades.