

MGMT 320 Fall 2006
Production/Operations Management
Section 03: T-Th 2:00-3:15pm Room: BUSNS 4115

INSTRUCTOR: José H. Dulá,
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OFFICE HOURS: Tuesday: 3:30-5:00, Thursday: 12:30-2:00pm
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(Other times available by appointment. Use email!)

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COURSE WEB PAGE: BlackBoard

TEXTBOOK: Operations Management 8th ed.
by Jay Heizer and Barry Render
Pearson Prentice Hall, Upper Saddle River, NJ 07458, 2005.
ISBN 0-13-185755-X
Textbook Web Site: www.prenhall.com/heizer

INTRODUCTORY STATEMENT.

All firms and organizations are involved in some sort of transformation process. The operations function of an organization is the one involved in this process. *Manufacturing* operations transform tangible inputs (e.g., raw materials) into tangible outputs which should be worth more than the total cost of the inputs. Transformation through manufacturing is the main reason why many firms operate. *Service* operations transform by transporting, storing, repairing, sorting and rearranging, etc. Production and Operations Management is the study of these transformation processes. This course is about some of the issues, techniques, and methodologies practicing managers use to make operations more efficient and competitive.

Operations management is *scientific management*. Decision making in the modern operations environment requires models that apply quantitative analyses and tools. That is why the course has a strong quantitative component. We study only a few of these models but we instill the discipline to search and apply available modelling tools whenever important operations decisions must be made.

The course is an undergraduate level introduction to the field of production and operations management. Much of what will be covered has practical application. The subject matter represents a blend of concepts from industrial engineering, cost accounting, general management, quantitative methods, and statistics. Many of you will be employed directly in these areas while others will have jobs that are indirectly related to this area. So, whether this is your field of study or not, knowledge of production and operations management will most certainly benefit you and the organization for which you will work.

HOMEWORK and EXAMINATIONS.

Homeworks will be assigned but not collected. Solutions to assigned homework problems will be posted in the course website and can be accessed through BlackBoard. You will be expected to do all your homework problems. Some of these problems may reappear (possibly slightly modified) in the examinations.

The grade for the course will be determined entirely by your score in four examinations and (possibly) a final. Each examination has two parts. The first part is a 20 multiple-choice quiz given first on the last 30 minutes of class (see Syllabus). The second part will be a word-problem exam over the full period on the following class time. The exams will be on the following dates:

Examination 1.	Multiple Choice:	Tuesday September 12, 2:45-3:15pm.
	Word Problems:	Thursday September 14, 2:00-3:15pm.
Examination 2.	Multiple Choice:	Tuesday October 10, 2:45-3:15pm.
	Word Problems:	Thursday October 12, 2:00-3:15pm.
Examination 3.	Multiple Choice:	Thursday November 2, 2:45-3:15pm.
	Word Problems:	Tuesday November 7, 2:00-3:15pm.
Examination 4.	Multiple Choice:	Tuesday December 5, 2:45-3:15pm.
	Word Problems:	Thursday December 7, 2:00-3:15pm.
Final.		Tuesday December 12, 1:00-3:50pm.

GRADE SCALE.

Grades will be assigned using the following scale:

A	85 or more points
B	70 or more but less than 85 points
C	60 or more but less than 70 points
D	50 or more but less than 60 points
F	Less than 50 points

Note: There is no rounding-up, no curves, no bonus points, no extra credit, etc.

POLICIES.

The course will be guided by the following policies:

1. **MAKEUPS.** Multiple choice tests can be made-up next time class period during the time for the word problem examination. This means you will have less time for the word problems if you need this make up. **You must notify me before the time of the Multiple Choice test that you will not sit for it. There is no make up if you do not notify me.** If you miss a word problem examination for any reason, you can make it up by taking the final. The final is the only make-up offered in this course. You can only make up one missed exam; any other missed exam will be a zero. The final will be comprehensive covering all the material in the course. Please reflect seriously on a decision to miss an examination since if you exercise this option, you will have to prepare for a long and difficult final. You will seriously regret a frivolous decision if you later have a legitimate situation that forces you to miss a second exam such as sickness or unexpected hardship.
2. **RETURNED EXAM BOOKS.** Corrected examinations will be returned during class. **You do not have the right to your exam if you do not pick it up when your name is called during class the day it is returned.** Any student who does not collect his/her examination book when they are handed back can look up their score on the internet through the course's *Blackboard* page. Your graded exam book is your "receipt." Do not discard it; you may need it later especially if there are discrepancies or mistakes in my records. Please do not ask friends to pick up exams for you. They will be denied.

3. “STATUTE OF LIMITATIONS” ON REVISIONS OF GRADED EXAMINATIONS. The student has until the date of the following examination to raise objections about the grading or to make requests for corrections, revisions, or reconsiderations of scores in exams. In the case of the fourth exam, the student has until the official date for the final.
4. COURSE WEB BLACKBOARD PAGE. The instructor assumes that all students have access to a computer with an internet connection. *Blackboard* is the internet access point for all information about the course. Copies and updates of all handouts (e.g., Introductory Statements and Course Plan and Schedule) and other documents will be kept there. Homework solutions will be accessed through this page as homeworks become due according to the syllabus. It is the student’s responsibility to read and understand the postings, messages, and announcements in this site. Make it a habit to visit this site regularly. You will need *Adobe Acrobat* “Reader” to access many of the posted documents. Grades for the examinations will also be posted on Bb. Please check grade postings as these reflect the contents of my records. Make sure any mistakes come to my attention.
6. HONOR. The students and the instructor are bound by the rules and regulations of VCU’s honor code see www.students.vcu.edu/rg/policies/honor.html. Students who subscribe to this code of honor deserve the instructor’s respect and consideration. Violations (cheating), however, will break this trust. The instructor is prepared to make use of all sanctions at his/her disposal in the event of violations of the honor code. This includes giving summary Fs for exams or for the course and taking the matter to the School’s honor council. Remember, it is the student’s responsibility to make sure that there is not even the *appearance* of impropriety in his/her behavior and dealings in course matters especially during examinations.
7. ETIQUETTE. Individual classes will be more productive and the course more enjoyable for all if we follow the following simple rules of etiquette:
 - Do not come to class late; but if you must, recognize that your entrance will disrupt. So, please be considerate of others and try not to disturb the lecture when you come in after the lecture has begun.
 - Leaving class early is always disruptive to the instructor and to other students. If you plan to leave early, as a courtesy please notify the instructor of your intentions before class and sit close to an exit.
 - Almost as bad as leaving early is rustling papers, thudding books shut, and unzipping bags in anticipation and preparation of the end of the lecture before this event actually occurs. Wait until the lecture is finished before preparing your exit.
 - Please do not read a newspaper, do crosswords, chat with friends, sleep, etc. **Turn off your cell phones and other noise-making gadgets before class.**
 - Poor performances in this class can be attributed to several factors. Not coming to class regularly is probably the main one. If you choose not come to class regularly do not blame the instructor for a poor performance. Also, it is your responsibility to obtain notes for missed lectures from colleagues.
 - Please read the document “Guidelines for Faculty Members Regarding Student Conduct in the Instructional Settings” at www.students.vcu.edu/rg/policies/conductguide.html

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Production/Operations Management

COURSE PLAN and SCHEDULE

This syllabus serves as a general guide for the course. Our objective is to try to follow this schedule. This plan is tentative and we can expect some deviations and adjustments.

Please refer to the *Introductory Statement* for information about the instructor, class textbook, midterms, etc.

First Week: Week of August 21 (Class meets only Thursday 8/24).

- Administrative announcements, introduction, and review of course syllabus.
 - Presentation of the course Blackboard (Bb) page.
 - Discussion of electronic resources.
 - **Treasure Hunt.** Go to the “First Treasure Hunt” Assignment Folder in Bb for the link to the *Business Week* article on how math is used for decision making. Read the article and find the names of the two OM experts being interviewed. Send the results of this treasure hunt with a pleasant greeting introducing yourself to your instructor using email (jdu1a@vcu.edu). Attach an e-photograph of yourself doing something interesting! (Note: the solution to this and all other treasure hunts will not be posted).
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Week 2: Week of August 28.

- Chapter 1: Operations and Productivity.
- Chapter 2: Operations Strategy in a Global Environment.
 - ★ Videotape. “Manufacturing Processes” (9:50 min).
 - ★ Videotape. “Production Tour of the Vision Light System at Federal Signal” (10:00 min).
- Quantitative Module A: “Decision-Making Tools”.
 - Quantitative Material.
 - The science of making decisions.
 - Decision making under complete uncertainty using payoff tables: “maximax,” “maximin,” “Equally Likely (Laplace)” decision strategies.
 - Note: the procedures above and all others in this supplements must be understood in terms of both revenues *and* costs.

HW01. p. 685 A.1, A.2, A.3, A.4.

Week 3: Week of September 4.

- Quantitative Module A: Cont'd.
- Quantitative Material.
 - Decision making under risk: expected monetary values (EMV) of decisions.
 - Expected value of Perfect Information (EVPI).
 - Decision Trees
- Chapter 5: Design of Goods and Services.
 - ★ Videotape. "Product Design and Manufacturing at Tri-State Industries, Inc." (8:40min), or
 - ★ Videotape. "Product Design at Regal Marine." (7:58min).

HW02. p. 685 A.5, A.6, A.13, A.14, A.20.

Week 4: Week of September 11: Midterm Week.

- Review for first examination.
 - Last 30 minutes of Tuesday lecture reserved for Multiple Choice Question quiz. Remember, there may be "bonus" points based on the Treasure Hunt and the videos.
 - EXAMINATION 1. Thursday September 14.
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Week 5: Week of September 18.

- Chapter 6: Managing Quality
 - ★ Videotape. "Quality" (12:58 min).
 - ★ Videotape. "Quality Product and Process Design at Detroit Diesel" (10:02 min).
- Chapter 7: Process Strategy
 - ★ Videotape. "Processes Strategy and Selection" (8 min).
 - ★ Videotape. "Manufacturing Processes" (9:50 min).
- Quantitative Module B: "Linear Programming".
- **Treasure Hunt.** Find out who was George B. Dantzig. HINT: Look for hint in Bb. Answer the question: What happened to George for arriving late to class?

HW03. Graph the following equations: $2x_1 + 3x_2 = 6$; $2x_1 + 3x_2 = 8$; and $2x_1 + 3x_2 = 10$. Find their intersections.
 - p. 713: Plot the feasible region in problems B.1, B.2, B.3, B.4, B.5. Graph only, do not solve.

Week 6: Week of September 25.

- Module B, cont'd.
- Quantitative Material.
 - Formulate a two-variable "Product-Mix" problem as an LP.
 - Present assumptions for LP modelling (linearity, additivity, non-integrality).
 - Graphic representation of feasible region.
 - Interaction of feasible region and objective function.
 - Present two algorithms for solving two-dimensional LPs: *i*) "Iso-profit line" (Objective Function Line Translation) and *ii*) "Total Enumeration of Corner Points".

HW04. p.714: B.6, B.7, B.8, B.10, B.12 (Formulate, graph, solve graphically using “iso-profit line” and “corner point enumeration” algorithms, and then solve using Excel).

Week 7: Week of October 2.

- Module B, cont'd.
- Quantitative Material.
- Solve using MS Excel.
- Study and interpret Excel output including “Answer” and “Sensitivity” reports (use the tutorial in the “Excel Solver Tutorial” link of the course web page.
- Special cases in LP: *i)* Unbounded LPs; *ii)* infeasibility; *iii)* redundancy; *iv)* degeneracy.

HW05. p. 716: B.16, B.23, B.24, B.26 (Formulate and solve using EXCEL).

Week 8: Week of October 9: Midterm Week.

- Review for first examination.
- Last 30 minutes of Tuesday 10/10 lecture reserved for Multiple Choice Quiz
- EXAMINATION 2. Thursday October 12.

Week 9: Week of October 16. Reading Day Thursday 10/19. Class Meets only Tuesday 10/17.

- Supplement Chapter 6: Statistical Process Control.
 - ★ Videotape. Statistical Process Control at Kurt Manufacturing (7:04).
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Week 10: Week of October 23.

- Supplement Chapter 6: Statistical Process Control.
- Quantitative Material.
- Control Charts for Variables: \bar{x} -Charts and R -Charts.
- Process Capability: Ratio, C_p , and Limit, C_{pk} .
- Chapter 8: Location Strategies.
- Quantitative Material.
- Factor Rating.
- Location Break-even Analysis.
- Center of Gravity Method.

HW06. p. 244 S6.4, S6.6, S6.8, S6.10, S6.12, S6.26, S6.30

HW07. p. 330 8.6, 8.10, 8.16, 8.18, 8.20

Week 11: Week of October 30. Last 30 minutes of Thursday 11/2 lecture reserved for Multiple Choice Quiz

- Chapter 15: Short-Term Scheduling.
- Quantitative Material:
- Job Sequencing using *First come, first served.* (FCFS).
- Job Sequencing using *Shortest Processing Time* (SPT).
- Job Sequencing using *Earliest Due Date* (EDD).
- Job Sequencing using *Longest Processing Time* (LPT).

- Job Sequencing using *Critical Ratio*.
- ★ Videotape. “Scheduling Services – The United Solution” (10:30 min).

HW 08. p. 620 15.10, 15.12, 15.14, 15.16

Week 12: Week of November 6: Midterm. Instructor out-of-town Tuesday 11/7

- EXAMINATION 3. Tuesday November 11.
 - Chapter 11: Supply Chain Management.
 - ★ Videotape: “Supplier Development Outreach Program, Toyota” (19:28 mins).
 - ★ Videotape: “Supply Chain Management at Regal Marine” (9:58min).
 - **Treasure Hunt.** Read the article at <http://www.lionhrtpub.com/orms/orms-10-99/cargille.html> on inventory management at Hewlett Packard and find the part on “relevant supply chain costs”. Send the list of these costs to your instructor via email.
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Week 13: Week of November 13.

- Chapter 12: Inventory Management.
 - ★ Videotape. “Inventory Management at Navistar and Caterpillar” (10:43 mins).
 - ★ Videotape: “Inventory Control at Wheeled Coach” (6:20 mins YellowStar/DVD2).
- Quantitative Material. Chapter 12: “Simple EOQ”
 - Derivation of “Total Annual Holding Costs” $(Q/2)H$, “Total Annual Ordering Costs” $(D/Q)S$, and “Total Annual Costs” $TC = (Q/2)H + (D/Q)S$ (note that unit price, P , is not used in this formula).
 - Graphs and explanation of the three annual costs.
 - Derivation of EOQ as minimizer of TC and as the quantity that balances annual holding and ordering costs.

HW09. p. 506: 12.5, 12.6, 12.7, 12.8, 12.9, 12.12, 12.14, 12.15.

Week 14: Week of November 20. Week of Thanksgiving Break

- Chapter 12: Cont’d
 - Quantitative Material. Chapter 12:
 - Production Order Quantity Model;
 - EOQ with quantity discounts:
 - Procedure for finding EOQ with quantity discounts.
 - Two cases, Case 1 “Fixed holding cost”.
 - Case 2: “Variable holding cost”.
- Step 1 Calculate “common” EOQ, Q^* .
- Step 1 Test if Q^* falls in the intervals with the lowest prices. If yes then STOP. use Q^* . If no then calculate TC_{Q^*} and compare with TC at all price break points of intervals with lower prices. Choose quantity that minimizes these TCs.
- Note that the TC formula when price discounts are involved uses the unit price, P as follow: $TC = (Q/2)H + (D/Q)S + PD$.

HW10. p. 506: 12.16, 12.18, 12.22, 12.23, 12.24

Week 15: Week of November 27.

- Chapter 16: Just in Time and Lean Production.
 - ★ Videotape: "JIT at Federal Signal" (10:28 mins).
- Chapter 17: Maintenance and Reliability.

HW11. p. 666: 17.7, 17.8, 17.9, 17.10, 17.12, 17.14.

Week 16: Week of December 4:

- Review for first examination.
 - Last 30 minutes of Tuesday lecture reserved for Multiple Choice Quiz.
 - EXAMINATION 4. Thursday December 7.
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FINAL EXAMINATION (Tuesday December 12, 1:00-3:50pm)