

DIS 300-201: Quantitative Analysis in Operations Management

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Instructor:	Anita Lee-Post	Semester:	Fall 2003
Office:	BE 455F	Office Hours:	MW 3:00 - 4:30pm
Phone:	257-1948	E-mail:	dsianita@uky.edu
Fax:	257-8031	E-mails will be responded within 48 hours	

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FEB 10 2004

TEXT:

Reid, R. Dan and Sanders, Nada R. Operations Management, John Wiley & Sons, Inc., 2002. ISBN: 0471-64019-0.

SOFTWARE:

Excel XP, available in the university's microlabs.

COURSE DESCRIPTION:

A study of quantitative approaches to operations management, including decision support systems in decision making applications and efficiency considerations in both service and manufacturing operations.

Specifically, this course is concerned with the economical use of inputs (human, capital, and material) in a transformation process that results in goods or services. It involves making decisions on how to best design and operate a production system. The term "production system" includes not only organizations that manufacture products but also those that offer services, such as hospitals, banks, government agencies, and restaurants. Thus, any organization that transforms inputs into outputs is subject to Production and Operations Management (POM) concepts. Our concern is for the managerial aspects of POM problems and not the engineering nor the technical feasibility of the process. This managerial emphasis takes the form of economic analyses of these alternatives, including statements of criteria, information requirements, and mathematical aids for solutions.

COURSE PREREQUISITES:

CS 101, ACC 202, ECO 261, STA 291, MA 113 or MA 123, 162

COURSE OBJECTIVES:

After completion of this course, you should be able to:

1. understand the role of operations management in supporting an organization's competitive priorities;
2. make operations related decisions that gives an organization a competitive edge;
3. apply mathematical techniques to solve operations related decision problems such as resource allocation, capacity planning, facility location, forecasting, aggregation planning, inventory control, project management, etc.;
4. gain hands-on experience in using EXCEL XP as a tool to solve operations decision problems effectively and efficiently.

*Approved by the  
Undergraduate  
Council  
2/3/4  
[Signature]*

**GRADING:**

There will be two exams, exam #1, exam #2, and one cumulative final examination. Exams #1 and #2 will each count as 15% of your grade and the cumulative final will count as 30%. These three exams are to be held in traditional format, i.e., you are required to be physically present to complete each exam within the allowable time. The dates for the exams are listed in the Course Coverage Section of this Syllabus. The remaining 40% of your grade is for course participation which includes discussion questions, case studies, practice problems, and assignment problems.

**COURSE WORK SUBMISSION:**

With each course participatory element listed here, you must follow the instructions given below to submit your work before its due date to receive full credit towards your participation score:

1. Discussion questions
  - **Post your answer via the discussion board.**
2. Case studies
  - **Prepare and save your answer electronically, e.g., in word.**
  - **Name your answer using the convention:  
YourFirstInitial\_YourLastName\_Case#**
  - **Submit your answer via the digital dropbox.**
3. Practice problems
  - **Prepare and save your answer electronically, e.g., in word or excel.**
  - **Name your answer using the convention:  
YourFirstInitial\_YourLastName\_PRACTICE#**
  - **Submit your answer via the digital dropbox.**
  - **Compare your answers with those given either from me or in the Appendix of your text.**
  - **Prepare a document electronically, e.g., in word, called  
YourFirstInitial\_YourLastName\_COMMENT# to explain:**
    - **why your answers are different?**
    - **how will you reconcile these differences?**
  - **Submit your comment via the digital dropbox.**
4. Assignment problems
  - **Prepare and save your answer electronically, e.g., in word or excel.**
  - **Name your answer using the convention:  
YourFirstInitial\_YourLastName\_ASSIGNMENT#**
  - **Submit your answer via the digital dropbox.**

In the event of unforeseeable technical difficulties, you can either fax me your work or drop it by my office in person. In no circumstance will I accept your course work as an e-mail attachment.

**LATE-PENALTY:**

Any course work submitted after the due date will be subjected to a penalty of 10% per day.

**MAKE-UPS:**

In instances where you fail to take either exam #1 or exam #2 when scheduled, the final exam will also serve as a make-up exam. Please see the "Student Rights and Responsibilities" handbook concerning circumstances that count as "excused absences." For example, if you miss exam #1, your final exam will carry a weight of  $30\% + 15\% = 45\%$  of your course grade. We strongly recommend that you do not miss your final exam schedule. In case you must, your reasons for the same must, again, fall strictly within the "excused absences" guidelines set forth in the handbook. If the absence is foreseeable, please inform your instructor well in advance (i.e., at least two weeks beforehand).

**ACADEMIC INTEGRITY:**

We consider academic integrity to be extremely important. We will make special efforts to identify any cheating during examinations. We will seek the most severe sanctions possible for any cheating that is uncovered. Please consult the most recent edition of the "Student Rights and Responsibilities" handbook for further information on Academic Offenses and Procedures.

**FACE-TO-FACE SESSION:**

To address any question you may have regarding any aspect of the course, four sessions are scheduled to allow you to interact with one another in a traditional class-room format. Your attendance at these sessions is entirely voluntary. The date, time, place, and purpose of each session are listed below:

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Date	Time	Place	Purpose
8/27	6:00 - 7:15 pm	BEIC lab	Introduction
10/1	6:00 - 7:15 pm	BEIC lab	Exam #1 Review
11/12	6:00 - 7:15 pm	BEIC lab	Exam #2 Review
12/10	6:00 - 7:15 pm	BEIC lab	Final Exam Review

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DIS 300-201: Quantitative Analysis in Operations Management

COURSE COVERAGE AND EXAM DATES:

Week	Dates	Topic	Chapters
1	8/27 - 9/2	Introduction	Ch. 1, 2
2	9/3 - 9/9	Break-even analysis	Ch. 3, 4
3-4	9/10 - 9/23	Quality control	Ch. 5, 6
5-6	9/24 - 10/1	Learning curve	Ch. 11
	10/2	EXAM #1, 6:00 - 7:15pm, BE 214	
7-8	10/6 - 10/17	Linear programming	Supplement B
9	10/20 - 10/24	Capacity planning	Ch. 9
10	10/27 - 10/31	Facility location	Ch. 9, Supplement C
11-12	11/3 - 11/12	Forecasting	Ch. 8
	11/13	EXAM #2, 6:00 - 7:15pm, BE 214	
13	11/14 - 11/21	Aggregate planning	Ch. 13
14-15	11/24 - 12/5	Inventory control	Ch. 12
16	12/8 - 12/12	Project management	Ch. 17
	12/17	FINAL EXAM, 6:00 - 8:00pm, BE 214	

DIS 300-0xx: Quantitative Analysis in Operations Management

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Instructor Semester: Fall 2003

Office: Office Hours

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**TEXT:**

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**SOFTWARE:**

Excel XP, available in the university's microlabs.

**OBJECTIVES:**

Production and Operations Management (POM) is concerned with the economical use of inputs (human, capital, and material) in a transformation process that results in goods or services. It involves making decisions on how to best design and operate a production system. The term "production system" includes not only organizations that manufacture products but also those that offer services, such as hospitals, banks, government agencies, and restaurants. Thus, any organization that transforms inputs into outputs is subject to POM concepts. Our concern is for the managerial aspects of POM problems and not the engineering nor the technical feasibility of the process. This managerial emphasis takes the form of economic analyses of these alternatives, including statements of criteria, information requirements, and mathematical aids for solutions.

**GRADING:**

The final grade will comprise homework assignments (10%), concept quizzes (5%), mid-term exam #1 (A %), mid-term exam #2 (B %), and a cumulative final exam (F %). The two worst homework assignments will be dropped for purposes of the calculation, i.e., treated as "byes". Concept quizzes are discussed below. The percentage weights A, B, and F would be selected to give maximum advantage to each student. The weight F cannot be less than 35%. And the weights A and B would each normally be 25%. However, either or both weights A and B can be dropped to 0 and the 25% in each case carried over to the weight F, for example if either mid-term is missed for any reason, or if the student's performance on the final is better than that on either or both mid-terms. Thus, the final exam would carry a weighting of: 60% of the final grade if either mid-term exam is missed, or if performance on the final is better than that on either mid-term; and a weighting of 85% if both mid-term exams are missed, or if the performance on the final is better than that on both mid-terms. On this basis, the final exam would effectively count as a make-up exam in cases where either, or both, mid-term exams are missed. Numerical grades will be converted to letter grades as follows: A = 85-100; B = 75-84; C = 65-74; D = 55-64; E = 0-54.

**CONCEPT QUIZZES:**

To encourage student preparedness, attendance, attention, and participation, a total of 10 concept quizzes will be given during the semester, each marked on a scale of 10, with a guaranteed minimum of 5 awarded for merely being present. Of the 10 quizzes, only the best 8 will count, i.e., two will be treated as "byes". There will be no "make-up" quizzes, for any reason. Concept quizzes may cover the previous class lecture, the reading assignment for the day, something we have just completed discussing in class, questions pertaining to homework assignments. You are required to use 3x5 index cards when completing these quizzes. These cards will not be returned to you. However, answers will be discussed during class. Credit will not be given for quizzes submitted on anything other than a 3x5 index card. Please go ahead and prepare your cards, making sure to write in the following information:

**Example Concept Quiz Card**

DOE, JOHN	QUIZ # _____	DATE
Section # _____		SSN:

**SCHEDULE CONFLICTS AND EXCUSED ABSENCES:**

Where students have final-exam schedule conflicts, the policy outlined in the Fall 2003 Schedule of Classes will govern. This allows for rescheduling of the exam in individual cases, at student request, in case of conflict and/or hardship. With respect to mid-term exams, in individual cases where demonstrable hardship may otherwise result, the instructor may allow affected students to take the mid-term a day earlier or later than the scheduled date. Where that is not possible, the cumulative final exam will serve effectively as make-up, as already indicated.

**ACADEMIC INTEGRITY:**

We consider academic integrity to be extremely important. We will make special efforts to identify any cheating during examinations. We will seek the most severe sanctions possible for any cheating that is uncovered. Please consult the most recent edition of the "Student Rights and Responsibilities" handbook for further information on Academic Offenses and Procedures.

**COURSE COVERAGE AND EXAM DATES**

<b>Week</b>	<b>Dates</b>	<b>Topic</b>	<b>Chapters</b>
1	8/27 - 8/29	Introduction	Ch. 1, 2
2	9/2 - 9/5	Break-even analysis	Ch. 3, 4
3-4	9/8 - 9/19	Quality control	Ch. 5, 6
5-6	9/22 - 10/1	Learning curve	Ch. 11
	<b>10/2</b>	<b>EXAM #1, 6:00 - 7:15pm</b>	
7-8	10/6 - 10/17	Linear programming	Supplement B
9	10/20 - 10/24	Capacity planning	Ch. 9
10	10/27 - 10/31	Facility location	Ch. 9, Supplement C
11-12	11/3 - 11/12	Forecasting	Ch. 8
	<b>11/13</b>	<b>EXAM #2, 6:00 - 7:15pm</b>	
13	11/17 - 11/21	Aggregate planning	Ch. 13
14-15	11/24 - 12/5	Inventory control	Ch. 12
16	12/8 - 12/12	Project management	Ch. 17
	<b>12/17</b>	<b>FINAL EXAM, 8:30 - 10:30pm</b>	

### HOMEWORK ASSIGNMENTS

Home-work assignments and due-dates are listed below. In addition to these assigned problems, you should at least review all of the "PROBLEMS" at the end of each chapter. Solution sets for the home-work assignments will be handed out when the marked assignments are returned, and selected problems will be addressed in class. Students who need additional help should please contact the instructor.

Week Due	Topic	Problems
2	Productivity	Ch. 2 #4, #7
3	Break-even analysis	Ch. 3, #8 Ch. 4, #4
5	Quality control	Ch. 6, #6, #8, #10, #12
6	Learning curve	Additional problems, #1, #2
8	Linear programming	Supplement B, #19, #20, #3, #4
10	Decision tree	Ch. 9, #5, #9
11	Facility location	Additional problems, #3, #4, #5
12	Forecasting	Ch. 8, #4, #14, #16
13	Aggregate planning	Ch. 13, #7, #8
15	Inventory control	Ch. 12, #12 Additional problems #6, #7
16	Project management	Ch. 17, #3, #13, #14



**ADDITIONAL PROBLEMS**

**#1**

On a typical rounds Dr. Holla was observed 20 times and the manager of the hospital tabulated the following:

Activity Observed	Number of times observed
With patient	6
Reviewing test results	3
On phone	2
Idle	1
Away on emergency	4
Not available	4

Calculate the sample size needed to estimate the proportion of time Dr. Holla spends away on emergencies.

- (b) Compute the sample size needed to estimate the proportion of time Dr. Holla spends reviewing test results. Calculate the minimum number of observations, which must be made to complete the work sampling analysis. Use the standard time estimate to be within 5% of the true mean 95% of the time.

**#2**

C&A is a manufacturer of hybrid cars. Based on past experience with similar products, you know that the rate of learning is 80%.

- (a) Estimate the direct labor required for the 16<sup>th</sup> car if C&A needs 50,000 hours to produce the first unit.  
 (b) Draw a learning curve for this situation.

**#3**

The main post office in Orlando, Florida, is due to be replaced with a much larger, more modern facility than can handle the tremendous flow of mail that has followed the city's growth since 1970. Since all mail, incoming or outgoing, travels from the seven regional post offices in Tampa through the main post office. Its site selection can mean a big difference in overall delivery and movement efficiency. Using the data in the following table, determine the map coordinates for the proposed new facility.

Regional Post Office	Map Coordinates (x, y)	Truck Round Trips per Day
Ybor City	(10, 5)	3
Davis Island	(3, 8)	3
Dale-Mabry	(4, 7)	2
Palma Cela	(15, 10)	6
Bayshore	(13, 3)	5
Temple Terrace	(1, 12)	3
Hyde Park	(5, 5)	10

#### ADDITIONAL PROBLEMS

**#4**

Refer to the situation described in Supplement C, problem #1, use Excel Solver to determine the amount of product to produce and send from each plant to each distribution center to minimize costs.

**#5**

Refer to the situation described in Supplement C, problem #7, use Excel Solver to determine the production and distribution plan that will maximize Wexford's profit (including finding which customer(s) does not receive all it wants).

**#6**

Assume that C&A produces type C fire extinguishers. They make 30,000 of these fire extinguishers per year. Each extinguisher requires one handle (assume a 300 day work year for daily usage rate purposes). Assume an annual carrying cost of \$1.50 per handle; production setup cost of \$150, and a daily production rate of 300. What is the optimal production order quantity?

**#7**

C&A need 1,000 electric drills per year. The ordering cost for these is \$100 per order and the carrying cost is assumed to be 40% of the per unit cost. In orders of less than 120, drills cost \$78; for orders of 120 or more, the cost drops to \$50 per unit. Should C&A take advantage of the quantity discount?

## Higgs, Retha

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**From:** Anita [dsianita@uky.edu]  
**Sent:** Thursday, January 29, 2004 5:14 PM  
**To:** Higgs, Retha  
**Subject:** Re: DIS 300

Hi, Retha:

The grading scale for DIS 300 is:

A = 85- 100

B = 75 - 84

C = 65 - 74

D = 55 - 64

E = 0 -54

Thanks, Anita.

At 11:19 AM 1/29/2004 -0500, you wrote:

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The UGC Subcommittee #2 reviewed the distance learning proposal for DIS 300, Quantitative Analysis in Operations Management, on Tuesday, January 27th. Because a grading scale was not included in the proposal, they cannot recommend approval at this time. However, if you will submit the grading scale to me prior to Tuesday, February 3rd, I will place it on the agenda for consideration at the next full Undergraduate Council. Thank you.

Retha Higgs (7-5448)

<mailto:Retha@uky.edu>Retha@uky.edu

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Anita Lee-Post  
Decision Science & Information Systems Area  
College of Business & Economics  
University of Kentucky

1/30/2004