

SYLLABUS
For

QUANTITATIVE ANALYSIS
FOR BUSINESS DECISIONS

BUS-305

Fall 2004

Dr. Jim Mirabella

Jacksonville University

GENERAL INFORMATION

Instructor: Dr. Jim Mirabella

Call #: 6231

Contact Information:

Email: jim@teacher.com

Phone: 287-5958

(do not call after 10 PM)

Instructor Bio: Dr. Jim Mirabella is self-employed as a consultant in research & analysis. He is the former Director of Institutional Research at FCCJ. He has a Doctorate in Management from Nova SE University, an MBA in Quantitative Methods from Auburn University, and a BS in Operations Research / Statistics from the U.S. Air Force Academy. Jim has been teaching for over 16 years (including the last 5 at Jacksonville University), and has served as a statistical analyst in the U.S. Air Force as well as Fortune 100 corporations. Jim also teaches Doctoral Research, Marketing Research, Operations Management, and Quantitative Methods.

Meeting Times: Tuesday evenings, 6:00 p.m. – 8:50 p.m.

Classroom: Davis 104

Course website: <http://www.DrJimMirabella.com/bus305>

Help/Tutoring: In addition to contacting me by email, I will be available in the classroom before & after each class. You can also get free assistance at **The Mathematics Center**, in room MP-114A. For hours of operation, call 256-7166 or check the *Resources* link at the JU website.

Learning Disabilities: If you have a diagnosed learning disability that necessitates special accommodations for this course, please inform your instructor. You may be asked to submit medical documentation to the office of the Dean of Students.

COURSE TITLE AND DESCRIPTION (Quoted from Current JU Course Catalog):

Quantitative analysis for business decisions introduces students to a collection of quantitative tools designed to enhance managerial decision-making. Topics to be covered include decision theory, forecasting, inventory control models, linear programming, project management techniques (PERT and CPM), queuing theory, and statistical quality control.

PREREQUISITE(S) OR SELF-TEST ON READINESS

Elementary Statistics (MS 205 or the equivalent)

COURSE OUTCOMES

Upon successful completion of this course, students will have learned:

1. How to choose the appropriate quantitative method from those listed above to address a given problem.
2. How to set up the problem.
3. How to solve the problem.
4. How to interpret the solution for the problem.
5. How to use the tools of quantitative analysis both with and without the required software.

REQUIRED MATERIALS

Render, Stair & Hanna (2003). Quantitative Analysis for Management. (8th edition). Prentice Hall. ISBN #0-13-066952-0.

MicroSoft Excel

CLASS POLICIES / NOTES

1. **TEACHING METHODS:** The course will mainly be taught as a facilitated lecture in the computer lab combined with online discussions for review only. The emphasis of the class will be on statistical thinking and understanding concepts, and class participation is vital to learning.
2. **OFFICE HOURS:** The instructor will be available for consultation immediately after class. He is also available on an as-needed basis by pre-arranged appointment.
3. **ATTENDANCE:** Due to the nature of the course, if any session is missed, it may become necessary for the student to withdraw from the course.
4. **RECOMMENDED PROBLEMS** will only be covered upon student request. These problems are indicative of the types of problems that will appear on exams. Students are encouraged to practice as much as possible, as it is the best preparation for success. Class time will also be allocated for practice in problem solving. The key to understanding statistical concepts that are tested is to be comfortable with the problem solving techniques first.
5. **EXAMS** come exclusively from classroom materials, which may or may not be in the text.
6. **READING** the book is recommended, but only after the material is covered in class.
7. **LATENESS:** Exams will be given at the start of class; students who are late will have less time to complete the exam.
8. **STUDY GROUPS:** The formation of study groups is highly recommended as a proven method for mastering this material and as a means of completing the take-home portions of exams.
9. **INCOMPLETES:** Unless prior arrangements are made, failure to complete all exams by the scheduled dates will result in a grade of "F." A grade of "I" will only be awarded in exceptional cases wherein the student cannot appear for the final examination due to an emergency; however, all homework must be submitted on time to be counted.

10. MAKE-UP EXAMS: There are no make-up exams in this class. If a student is aware of a future absence, prior arrangements must be made to reschedule the exam.

11. GRADING: Students will receive the grade they earn.

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Grading Criteria for Exams

- There will be two exams worth 90% of the course grade.
- Each exam will consist of word problems that require the use of QM for Windows. The remainder of the exam will address quantitative concepts and an understanding of the techniques used to solve the problems, as well as quantitative concepts. Some questions will reflect lessons from the videos and classroom activities.
- During each exam students will be allowed the use of the computer, the course textbook and all notes / handouts (OPEN BOOK / OPEN NOTES).
- The final exam is not comprehensive.
- Students who arrive late for an exam will have less time to complete the exam.

Grading Criteria for Class Participation:

- Attendance does not automatically equate to 10%; students are expected to actively participate in class discussions.
- A participant's course participation grade will be based on the professor's assessment of the quality of the participant's constructive contributions to the learning experiences of all course participants. Constructive contributions are those which are orderly, cooperative, informed, respectful of others, and not domineering.

<u>Grading criteria</u>	
Exam 1	45%
Exam 2	45%
Class Participation	10%

<u>Grade Determination</u>	
90.0 ~ 100.0	A
80.0 ~ 89.9	B
70.0 ~ 79.9	C
60.0 ~ 69.9	D
Below 60.0	F

POLICY ON ATTENDANCE:

It is important that students make every effort to attend each class, as they will be responsible for all missed work. Due to the nature in which the lessons build on each other in this course, a student's grade may suffer from any absence. Class participation scores will be penalized for absence or excessive lateness.

ACADEMIC HONESTY

JU students are expected to adhere to the highest standard of academic honesty. Plagiarism, which is defined as the use of someone else's words or ideas without an appropriate acknowledgment, and other acts of dishonesty in taking examinations or in the performance of academic assignments are regarded by the faculty as major offenses which merit stern disciplinary action. All incidents of academic dishonesty are reported by the faculty member first to the chair of the division or equivalent academic unit in which the alleged infraction occurred. If satisfactory resolution is not attained, the matter will be referred to the dean of the appropriate college. Should either the student or the faculty member be dissatisfied with the dean's decision, the matter may be appealed to the Faculty Grievance Committee. Incidents of academic dishonesty and the resolution shall be reported to the Vice President for Academic Affairs for record-keeping purposes.

CLASS OUTLINES / ASSIGNMENTS

PRE-COURSE ASSIGNMENT: None

CLASS ONE

CLASS ONE OBJECTIVES

By the end of this CLASS, students will be able to:

1. Understand the role of quantitative analysis in decision-making.
2. List and describe the 7 steps of the QA approach, along with possible problems in each step.
3. Understand the fundamentals of decision theory.
4. List and describe the six steps in decision theory.
5. Distinguish between the different types of decision-making environments.
6. Do problems involving sensitivity analysis (decision-making under risk only).
7. Do problems for decision-making under uncertainty, including the optimistic criterion, the pessimistic criterion, the equally likely criterion, the criterion of realism, and minimax regret.
8. Do decision theory problems involving a sequence of decisions using a decision tree.
9. Use Excel to solve these problems as well as being able to solve them without the assistance of the software.

CLASS ONE TOPICS

1. Introduction / Overview
2. Game Theory
3. Use of *Excel*
4. Ch. 1: Intro to QM
5. Ch. 3: Decision Making

CLASS ONE ASSIGNMENTS DUE (to be completed prior to CLASS Two)

Recommended problems

- Ch. 1, problems 14, 15, 16, 17
- Ch. 3, problems 10, 11, 15, 19, 21

CLASS TWO

CLASS TWO OBJECTIVES

By the end of this CLASS, students will be able to:

1. List reasons why a business needs to hold inventory.
2. List and define the different costs of inventory.
3. Determine the optimal order quantity using EOQ (economic order quantity).
4. Calculate the inventory costs associated with a given order quantity.
5. Determine the reorder point.
6. Do EOQ with quantity discounts.
7. Determine safety stock with unknown stockout costs using the service level approach.
8. Perform sensitivity analysis for inventory problems.
9. Do inventory control problems both by hand and with the aid of Excel.

CLASS TWO TOPICS

1. Review homework
2. Ch. 6: Inventory
3. Dice Game
4. Inventory video

CLASS TWO ASSIGNMENTS (to be completed prior to CLASS Three)

Prepare for Exam 1

Recommended problems

- Ch. 6, problems 17, 18, 20, 24abcdef, 25abdef, 31, 42, 45

CLASS THREE

CLASS THREE OBJECTIVES

By the end of this CLASS, students will be able to:

1. Set up and solve transportation and assignment problems.
2. Distinguish between the different types of forecasts - time series, causal, and qualitative models.
3. Decompose a time series, and provide definitions for each component of a time series.
4. Set up and solve forecasting problems using times series techniques that smooth data: moving average, weighted moving average, and exponential smoothing.

5. Find the best forecast from a group of competing forecasts by using a measure of forecasting error such as mean absolute deviation.
6. Set up and solve forecasting problems requiring trend line analysis.
7. Compute and interpret a seasonal index.
8. Prepare a seasonally-adjusted trend forecast.
9. Differentiate between a time series model and a causal model.
10. Understand the basic concepts of correlation, simple regression, and multiple regression.
11. Use regression and correlation to forecast.
12. Do forecasting techniques both by hand and with the assistance of Excel.

CLASS THREE TOPICS

1. Review homework
2. Ch. 5: Forecasting
3. Ch. 10: Assignment Models
4. Review for exam

CLASS THREE ASSIGNMENTS (to be completed prior to CLASS Four)

Recommended problems

- Ch. 5, problems 15, 18, 29, 35, 37
- Ch. 10, problems 30, 32

Prepare take-home portion of mid-term exam

Prepare for mid-term exam

CLASS FOUR

CLASS FOUR OBJECTIVES

None

CLASS FOUR TOPICS

1. Mid-term Exam

CLASS FOUR ASSIGNMENTS (to be completed prior to CLASS Five)

None

CLASS FIVE

CLASS FIVE OBJECTIVES

By the end of this CLASS, students will be able to:

1. Provide a definition of linear programming.
2. List the properties of a linear program.
3. List the assumptions behind linear programming.
4. Formulate linear programs for a variety of common business problems.

5. Solve a linear program with two decision variables with a graph.
6. Solve linear programs with more than two decision variables using Excel.
7. Identify the four special cases in linear programming.
8. Perform sensitivity analysis for a linear program.

CLASS FIVE TOPICS

1. Ch. 7 - 9: Linear Programming
2. Lego game

CLASS FIVE ASSIGNMENTS (to be completed prior to CLASS Six)

Recommended problems

- Ch. 7, problems 14, 17, 18, 19, 25, 26, 34
- Ch. 9, problems 28, 29, 30

CLASS SIX

CLASS SIX OBJECTIVES

By the end of this CLASS, students will be able to:

1. List and define the different costs of a queuing system.
2. List and define the different characteristics of a queuing system, including the arrival characteristics, the waiting line characteristics, and the service facility characteristics.
3. List the assumptions of the single-channel queuing model with Poisson arrivals and exponential service times.
4. Calculate (by hand and with Excel) the different queuing equations for this queuing system.
5. Find the best level of service to provide for a queuing system, given all the relevant data.

CLASS SIX TOPICS

1. Review homework
2. Ch. 14: Waiting Lines
3. Queueing video
4. Beer game
5. Review for exam

CLASS SIX ASSIGNMENTS (to be completed prior to CLASS Seven)

Prepare take-home portion of final exam

Prepare for final exam

Recommended problems

- Ch. 14, problems 11, 12, 13, 14

CLASS SEVEN

CLASS SEVEN OBJECTIVES

By the end of this CLASS, students will be able to:

1. Differentiate between a project and the activities that comprise it.
2. Distinguish between PERT and CPM.
3. Given the activities of a project and their immediate predecessors, construct the network diagram.
4. Find the expected time to complete an activity, given the optimistic, most probable, and pessimistic time estimates for the activity.
5. Find the variance in the time to complete an activity, given the optimistic and pessimistic time estimates for the activity.
6. Define and find early start, early finish, late start, and late finish for an activity.
7. Find activity slack for an activity.
8. Define and find the critical path by hand and by using Excel.
9. Find the expected time to complete the project.
10. Find the probability a project will be completed within a certain amount of time.

CLASS SEVEN TOPICS

1. Ch. 13: Project Management

CLASS SEVEN ASSIGNMENTS (to be completed prior to CLASS Eight)

Recommended problems

- Ch. 13, problems 13, 19

CLASS EIGHT

CLASS EIGHT TOPICS

1. Course Evaluations
2. Complete Final Exam