QA 525
SPRING QUARTER
2006-2007 ACADEMIC YEAR

Instructor: James J. Cochran, Ph.D.

Office: 117A CAB

Telephone: (318)257-3445

Hours: M, W 8:30 a.m. – noon
T 8:30 a.m. –11:30 a.m.
or by appointment

e-mail: jcochran@cab.latech.edu

URL: http://www.cab.latech.edu/jcochran/index.htm

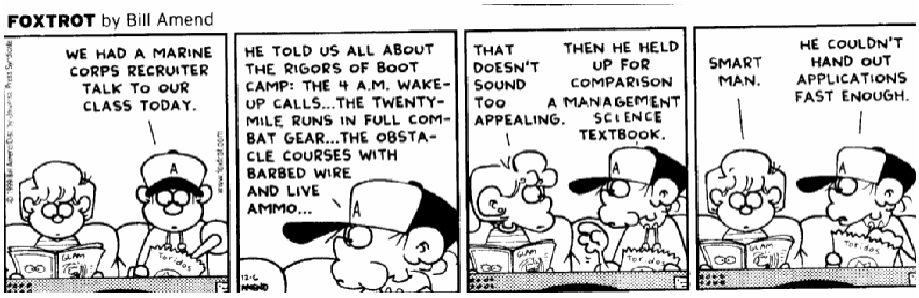
Textbook(s): Lapin, Lawrence L. & William D. Whisler, *Quantitative Methods for Business Decisions with Spreadsheet Applications*, Duxbury Press, 7th edition, 2002

Prerequisite: QA 233 (Basic Business Statistics), QA 390 (Quantitative Methods for Business & Economics) and computer literacy (ability to learn and use Excel)

Grading:

Cases/Computer Assignments (6)	90 points
Midterm Exams (2)	200 points
Comprehensive Final Exam	150 points
	440 points

Are Quantitative Methods Courses Difficult?



POPULAR OPINION SUGGESTS SO!
But this doesn't have to be the case!

HOW TO GET THROUGH QA WITH *MINIMAL* DIFFICULTY

1. **Keep up with the material – the course is extremely cumulative, so most students have great difficulty if they fall behind. Look at the assigned material before the lecture, review the covered material after the lecture, and don't hesitate to ask questions!**
2. **Spend *quality time* studying the subject – studying Quantitative Methods for 10 hours on the two days before an exam is not as effective as studying one hour daily for ten days prior to the exam.**
3. **Develop an understanding of the concepts – superficial knowledge will not get you by in Quantitative Methods. Attempt to work practice problems on the Virtual Classroom before looking at the answers, and work in groups (this helps immensely).**

I. Introduction to Modeling & Quantitative Analysis

A. Basic Concepts & Definitions

1. **Quantitative Analysis (QA) - a broad discipline that includes all scientific method based rational/ mathematical approaches to decision making.**

2. **Pseudonyms for QA - Management Science (MS), Operations Research (OR), and Decision Science (DS).**

3. **History - Early development and application by US during World War II, has thrived in business and industry with the development and availability of powerful computers (and especially personal computers).**

B. Models

1. **Model - Abstraction of reality. Types include:**

   a. **Iconic - physical (scalar) representation, usually of some object (i.e., an architect's model of a building)**

   b. **Analog - physical models that do not physically resemble the object being modeled (i.e., a bathroom scale)**

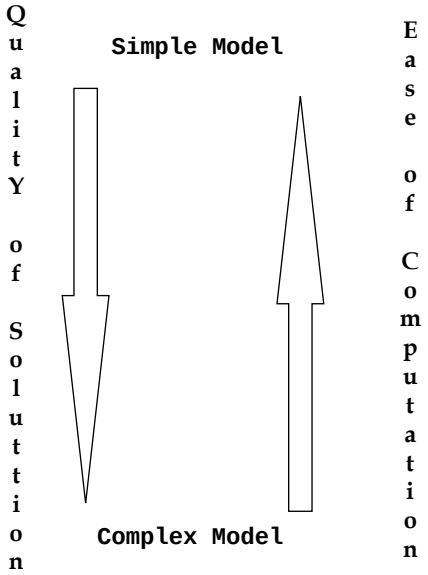
   c. **Mathematical (Quantitative) - numerical/symbolic representation or abstraction of a complex real situation or system (this is what we are interested in!)**

2. The Value of a Model

a. The value of a model is directly proportional to how representative it is of the real world.

b. The value of a model is inversely proportional to how easy it is to solve (i.e., directly proportional to its complexity).

- this leads to *The Modeler's Dilemma* - how to provide a simple yet realistic representation?



3. Components of Quantitative Models

a. Parameters - known characteristics of the situation/system to be modeled - also called *Uncontrollable Inputs*

b. (Decision) Variables - unknown quantities/ behavioral characteristics of the situation/system to be modeled whose values are to be determined at the decision maker's discretion - Note that these also called *Controllable Inputs* and the j^{th} decision variable is usually denoted X_j.

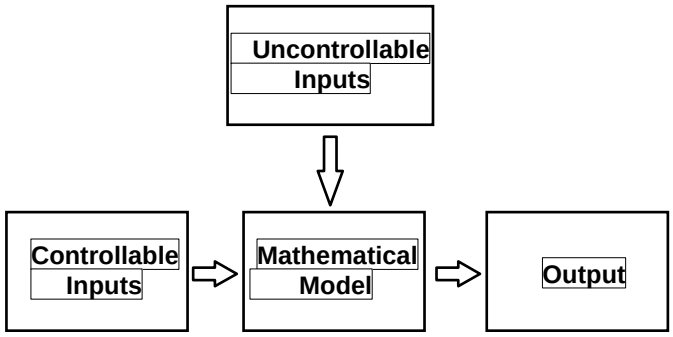
These components are linked together through mathematical expressions that comprise the *model*.

c. Objective Function - mathematical relationship between parameters and decision variables that represents relative effectiveness of proposed solutions to a problem.

d. Constraint - mathematical relationship between parameters and decision variables that represents a limitation on objective function.

We usually wish to optimize (maximize or minimize the *Objective Function* while satisfying the *Constraints*.

Note that we usually refer to the set of potential solutions that satisfy all constraints as the *Feasible Region* and any single solution that satisfies all constraints as a *Feasible Solution*.



4. **Classes of Quantitative Models**

   a. **Deterministic - models for which the values of *all parameters are known with certainty*.**

   b. **Stochastic Models - models for which the potential values for some parameter(s) is(are) subject to known variation, i.e., their probability distributions are known**

   c. **Statistical Models - models for which the potential values for some parameter(s) is(are) subject to unknown variation, i.e., are estimated with sample data**

5. **The Purpose of Building Quantitative Models**

   a. **Model construction leads to insight regarding the system being modeled**

   b. **Mathematical models can be used to maximize or minimize some objective (function of the decision variables) subject to some limitations or constraints (the values of the decision variables that provide the mathematically-best output are referred to as the optimal solution for the model).**

C. Applications - Areas of application of QA to business disciplines include: