

Course: GSB 420, Applied Quantitative Analysis
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Course Content and Objective: This course covers various topics in mathematics, probability theory, statistics, and regression analysis. The objective is to provide practical knowledge of mathematical and probability/statistical topics that are the most relevant and useful in a graduate business program. The course is analytical and theoretical to the extent that is necessary in order to develop correct insights and practical understanding of the topics presented. The course is problem oriented and uses Minitab and Excel software.

Textbook: *Business Statistics: A First Course*, 4th Edition, by David Levine, Timothy Krehbiel, and Mark Berenson, published by Pearson/Prentice Hall. Minitab software comes packaged with this volume. This text is soft cover; not the hardback edition.
Supplementary Material: *SparkCharts*, *Calculus I*, published by Barnes and Noble.

Course Outline and Topics

I. Mathematics (*Sparks*)

Sets and Some Counting Rules

Functions – linear, quadratic, exponential, logarithmic functions

Differentiation – sum, difference, product, quotient, and chain rule\;

derivatives of polynomial, exponential, and logarithmic functions

Optimization Problems – unconstrained and constrained problems

II. Probability and Statistics

Basic Terms and Some Descriptive Statistics (Chapters 1,2,3)

Calculating Probabilities – basic events, unions and intersections of events,
conditional probabilities, Bayes Formula (Chapter 4)

Random Variables – probability density functions, probability distribution functions,
expectations (Chapter 5)

Probability Distributions – Bernoulli, Binomial (Chapter 5), Uniform, Normal (Chapter
6), Student's t, Logistic

Jointly Distributed Random Variables – covariance and correlation coefficients

Sampling Distributions, Interval Estimates, and Hypothesis Testing (Chapters 7-11)

III. Regression

Simple Regression – understanding typical basic computer output (standard errors of coefficients, standard error of estimate, analysis of variance, R^2 , correlation coefficients, hypothesis testing, confidence intervals,

regression assumptions) (Chapter 12)

Multiple Regression – relationship to simple regression, interpretation of computer output, F statistic (Chapter 13)

Categorical Variables – Dummy variables as independent variables, categorical dependent variables (Logit models)

Non-linear Models – quadratic and higher order polynomial models, exponential, logarithmic functions

IV. Non-parametric Statistics – Spearman's correlation coefficient, Kendall's τ , hypothesis tests

Computer Software: Excel and Minitab

Course Grade Determination: Exam 1, 4th week, 25% of course grade; 100 points
Exam 2, 8th week, 25% of course grade; 100 points
Final Exam, 11th week, 50% of course grade; 200 points
Total Possible Points in Course: 400

These exams may have some points assigned to problems done outside of class; this is especially likely for the final exam. The second exam is not cumulative. The final exam is cumulative.

There will be other problems (separate from the exams) that I will ask you to complete outside of class. If you hand in these problems and if in my judgment they are substantially correctly done, then I will raise your grade to the next higher grade. The possible grades in the course are A, A-, B+, B, B-, C+, C, C-, D+, D, and F. By "next higher grade" I mean the next higher grade in the foregoing sequence, for example, from C- to C or from B+ to A-. These problems will not be returned to you; I will keep them in a file and evaluate them when I determine your final grade. These problems are due when I start the next class period after they are assigned. They will not be accepted after I begin class even if you are late for class or miss class for any reason. You may also fax your solutions to these problems to me, but a fax will only be accepted if it is received before the scheduled start time for the class in which it is due. One more comment about these problems: They are for you to think about and puzzle through, so I will only answer clarification-type questions, not substantive-type questions before they are due. After the due date, I, of course, will try to fully explain and solve these problems in class.

Course dedicated to the memory of Todd Beamer (1969-2001) -- 9/11 hero of United Airlines Flight 93 and DePaul University Kellstadt Graduate School of Business graduate in 1993.