GSB 519
Quantitative Analytics
spring Quarter 2022

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COURSE DESCRIPTION:

This course provides a comprehensive review of some basic mathematical and statistical methods and stresses their practical applications in business and economics. The course will equip the student with the quantitative skills required in the MBA program and will also provide a good foundation for addressing typical problems that arise in business.
This course will stress learning through applications/problem-solving using Excel software for data analyses. However, the course must be analytical and theoretical to the extent that is necessary to develop a correct understanding of the topics presented. The topics covered in the course include relevant mathematical concepts: graphing functions, solving a system of equations, understanding logarithms and exponential functions, and calculating slopes of linear and nonlinear functions. It also focuses on relevant statistical concepts: probability theory, statistical distributions, hypothesis testing and regression analysis.

TEXT:

1) Math portion of the course: No text. I have online lectures (available on DePaul D2L) and problems to help you through this part of the course.
2) Statistics portion of the course: *Business Statistics a First Course*, 8th Edition; Levine, Szabat and Stephan (LSS). I suggest trying to get a binder version, an online ebook version, or a used version. New, hardback copies are $235 on Amazon. We will not refer to the text until after the 3rd week, so you have some time to buy or rent it. You can also use the 7th edition or the *Global Edition*. if you can find a copy online. Some of the problems in the other editions are different, but I currently have the solutions for the 7th edition on D2L. I will post the solutions to the 8th edition problems as soon as I receive them from the publisher.

SOFTWARE PACKAGE: All of the mathematics and many of the statistical concepts/techniques taught in this course are best learned through problem solving. For ease in computation, we will use Excel at the end of the statistics part of the course for regression analysis.

LECTURES AND FOCUS:
There are online PowerPoint/Audio lectures for all math topics and some statistics topics (on DePaul D2L). The remaining statistics lectures will be posted in the next couple of weeks.

EXAMS: There will be an online Mid-term Exam (Available on DePaul D2L 29APR – 08MAY) and an online Final Exam (Available on DePaul D2L 01-10JUN). The online exams will be multiple choice, but will consist of problems drawn from online lectures, assignments and readings. The Final Exam will be multiple-choice. It will not be comprehensive, per se, but the material in the latter part of the class builds on material covered in the first half of the course.

ASSIGNMENTS: The only way to learn mathematics and statistics is to work problems, problems and more problems. My D2L site contains problems and solutions for the mathematics portion of the course. My website also lists assignment problems in your statistics text and the site has a link for the solutions to the problems in the statistics text. The text is composed mainly

of exercises, many of which are interesting applications of the statistical concepts explained in the book. You will have frequent reading assignments and problem solving assignments from the text (a total of 6 assignments, consisting of approximately 10 required problems per week – you are encouraged to work more problems). The assignments will not be graded, but answers are provided on D2L.

GRADES: The two exams will comprise 80% of your course grade (40% for each). For submitting all your assignments, You will automatically receive a 95% for 20% of your course grade.

TENTATIVE SCHEDULE:

Mathematics Review – Review Sheet on DePaul D2L

Algebra (Review on DePaul D2L) – Weeks 1 & 2

Topics: Functions, manipulating equations, solving linear equations in two unknowns, solving quadratic equations, and logarithmic and exponential functions.

Applications: Solving for a system of linear supply and demand functions, and linear macroeconomic models. Linearizing production functions. Models of population and economic growth. Financial topics on present/future value and compounding.

Slopes of Linear and Non-linear Functions (Review on DePaul D2L) – Weeks 2-4

Topics: Developing the concept of slope. Use of the concept of slope in statistical models for decision making. Slopes of linear and non-linear functions. Basic rules for finding slopes of linear and non-linear functions.

Applications: Discrete versus continuous growth, and compounding. Growth rates and elasticity. Partial effect of changes in a right-hand-side (RHS) variable on a left-hand-side (LHS) variable (i.e., when all other RHS variables are held constant).

Probability and Statistics (TEXT: *Business Statistics a First Course,* 7th Edition; Levine, Szabat and Stephan (LSS))

By the start of the third Lecture you should have already read your textbook

- Chapter 1: Introduction (browse)
- Chapter 1 Appendix: Use of Excel
- Chapter 2: Presenting Data in Tables and Charts (browse)

I will not lecture on these chapters, but you should peruse them.

Descriptive Statistics – Week 4: LSS Chapter 3, Sections 3.1-3.4.

Measures of central tendency (mean, median, mode). Measures of spread (variance, standard deviation, skewness) correlation. Measures of association (covariance, correlation coefficient).

Basic Probability – Week 5: LSS Chapter 4, Sections 4.1-4.4.

Understanding and computing probabilities (simple, joint, conditional, independence, Bayes' Theorem.)

Mid-term Exam online (includes material on mathematics and statistics up to this point) [29APR – 08MAY]

Probability Models/Distributions – Week 6: LSS Chapter 5, Sections 5.1-5.3.

Concept of Probability Models (Random Variables (RV), Mean and Variance of RVs, probability density functions).
Discrete Probability Models (Binomial and Poisson distributions)

Probability Models/Distributions (cont.) – Week 7: LSS Chapter 6, Sections 6.1-6.3.

Continuous Probability Models (the Normal distribution)

Hypothesis Testing – Week 8: LSS Chapters 9 and 10 (Sections 9.1-9.5 and 10.1 – 10.5)

Hypothesis Test Methodology, Z-statistics, critical value of test statistic, p-value, connection to interval estimation One-tailed tests. Two-tailed tests using same concepts.)

Simple Linear Regression – Week 9: LSS Chapter 12 (Sections 12.1 through 12.4, and 12.7)

Basic Linear Regression (Least Squares Method, computing regression coefficients, measures of variation and fit, residual analysis, autocorrelation, inference about slope coefficient, confidence intervals for slope coefficient)

Multiple Regression – Week 10: LSS Chapter 13 (Sections 13.1 and 13.2)

Development of Multiple Regression Model (interpretation of multiple coefficients, R-squared and adjusted R-Squared, residual analysis, inference about the slope coefficients, confidence interval estimation,

Dummy Variables – Week 10: LSS Chapter 13 (Section 13.5)
Use of qualitative variables.

Final Exam online (not comprehensive)
[01-10JUN]