GSB 519 -- Business Analytics Tools (Known as GSB 420 in a previous life.)
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Course Objective
The course objective is to provide practical knowledge of mathematics, probability theory, statistics, and regression techniques that are the most relevant and useful in a graduate business program and after completion of an MBA. Mathematics and probability will be useful in some of your MBA courses, but mathematics and probability also are the language of statistics and regression analysis and serious work in statistics and regression analysis requires their use. The course develops ideas, concepts, and vocabulary that graduates of quality MBA programs are expected to know. Although the course is problem oriented, it also is analytical and theoretical to the extent that is necessary in order to develop correct insights and practical understanding of topics presented.

A few ideas to contemplate about probability and statistics follow:

Attributed to Pierre-Simon Laplace: "Life's most important questions are, for the most part, nothing but probability problems."

From the short story *Funes, The Memorious* in 1942 by Argentine author Jorge Luis Borges: "[Funes'] memory was infallible…. Funes not only remembered every leaf on every tree of every wood, but every one of the times he had perceived or imagined it….Nevertheless, he was not capable of thought. To think is to forget a difference, to generalize, to abstract. In the overly replete world of Funes there were nothing but details." Steven Stigler in *Seven Pillars of Statistical Wisdom* (2016) says "Funes was big data without Statistics."

Attributed to H. G. Wells: "Statistical thinking will one day be as necessary for efficient citizenship as the ability to read and write."

Reading and Voiceover Material
The textbook for the course is *Statistics for Managers, Using Microsoft Excel*, Eight Edition by David Levine, David Stephan, and Kathryn Szabat and published by Pearson. Earlier editions, such as the seventh or sixth edition, can be used as well. If there is a later edition (i.e., ninth edition), it can be used; but it will be more expensive. However, the textbook is mostly for reference purposes.

Important reading and voiceover material is on D2L. This material is found under Content on D2L.

Software
Excel and Minitab are the main pieces of software for the course. You can get basic Excel tutorials through the <u>DePaul LinkedIn Learning Campus Portal</u>. Minitab is available remotely through DePaul's Virtual Lab, simply type http://vlab.depaul.edu and sign-in as you would to Campus Connect (a 30-day Minitab free trial also is available from the vender if desired but not necessary).

Staying in Contact
We will keep in touch through D2L and email. There is how things will work: (1) I will post an assignment on D2L usually about one week before it is due. (2) After a couple days, I will open a discussion on D2L asking whether you have questions. If you do, you ask a question; and the entire class can see it. I invite other class members to respond to the entire class if they think they can answer your question or be helpful in some way. This will enable us to learn from each other. (3) If a question is not clarified by class members, I will try to clarify things after a few days. (4) No private emails to me on course material. If you have a question, it is likely that others have a similar question; and we can all learn from resolving the question. (5) You can send me a private email if it is personal and not related to course material.

Course Outline and Topics
I. Mathematics
Sets, Counting Rules, and Summation Notation (Appendix A of textbook)
Functions – linear, quadratic, exponential, logarithmic functions (reading material on D2L)

II. Probability and Statistics
Sampling, Graphs, and Descriptive Statistics (Chapters 1,2,3)
Calculating Probabilities – basic events, unions and intersections of events
                         conditional probabilities (Chapter 4)
Random Variables – probability mass functions, probability distribution
                     functions, expectations (mean, variance, skewness, kurtosis)
                     (Chapters 3,5)
Discrete Probability – Bernoulli, Binomial Random Variables (Chapter 5)

Continuous Probability – Normal Distribution (Chapter 6)

Sampling Distribution, Confidence Intervals, Hypothesis Testing (Chapters 7,8,9,12)
                     (some of this material may be covered in the context
                     of regression analysis)
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,
                     prediction intervals, F statistic, t statistic) (Chapters 13,14)
Multiple Regression – several predictors, dummy variables (Chapter 14)
Non-linear Models – quadratic, exponential, and logarithmic models, logit functions

(Chapters 14, 15)

Grades
Grades will be determined through a series of 10 assignments. Each assignment is 25 points. Assignments will usually entail some hand-written work and Excel or Mintab work.

Rules for assignments follow; please read them carefully.

1. Assignments must be submitted using Submissions on D2L.
2. **All assignments must be in a Word file.** If you paste something into your Word file, please send it to yourself first to make sure everything is clearly readable (especially handwritten work) and is oriented correctly and not rotated 90 degrees or upside down. Again, please send the file to yourself to check for readability before submitting it on D2L.
3. Hand-written work is fine in the body of assignments as long as the work is easily readable, legible, and pasted into your Word file. .
4. Excel or Minitab output should be copied into your Word file.
5. **Your entire assignment must be in one, and only one, Word file.**
6**. Each assignment must have a filled-in Summary Sheet (provided by me) as the first page of your submitted assignment file. This Summary Sheet must be fully editable by me as the very first part of your Word file. This sheet cannot be a screen shot or anything else into which I cannot easily type and edit. Do not use red type anywhere on the Summary Sheet**
7. Each completed assignment consists of a Summary Sheet followed by your detailed work showing the reasoning and calculations used to get to your final answers. No credit will be given without showing your more detailed work.
8. Assignments are due on Tuesdays at 5:00 PM (about one week after you receive assignments).
9. Optional Zoom Question and Answer sessions for the assignment next due are scheduled at 5:30 PM on Wednesdays (about a week before assignments are due). Zoom sessions will be recorded and made available to all class members.

Final Comment
There must be structure in order for an online course to work reasonably well, otherwise there will be a hopeless mess. For this reason, please read and carefully follow the rules for assignments listed above. Also, please make use of the Discussion boards that I will post for assignments. Please, no private email about course material; the purpose of the Discussion boards is to deal with course material related questions and comments.

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.