

## GSB519: BUSINESS ANALYTICS TOOLS ONLINE SYLLABUS - Fall 2022

This course provides foundational quantitative analytical skills to address typical problems that arise in business. The course emphasizes a problem-oriented approach utilizing software applications from Excel for data analyses. The topics covered in the course include relevant mathematical concepts such as algebra and probability theory/application as well as a strong focus on fundamental statistical tools such as hypothesis testing, regression analysis and forecasting.

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### COURSE INFORMATION

- **Modality & Location:** Flex – Online via D2L/Zoom or DePaul Center Room 8204
- **Meeting Time:** MW, 11:50am-1:20pm
- **Professor:** Thomas Walker
- **Email:** twalke14@depaul.edu
- **Preferred Contact Method:** Email. Please use *GSB519* as a prefix in the subject line. Be sure to use your @depaul.edu email address to avoid any email filter issues. I do my best to respond to email within 24 hours. Sometimes I reply immediately, other times may take a bit longer, but never longer than 48 hours.
- **Office Hours:** In person & virtual – by appointment or TBD.

### COURSE OVERVIEW

This course will provide practical knowledge of mathematics, probability theory, statistics, and regression techniques that are the most relevant and useful in a graduate business program and upon completion of an MBA. Mathematics and probability may be useful in other MBA courses. Mathematics and probability are the language of statistics and regression analysis and serious work in statistics and regression analysis requires their use. This course develops ideas, concepts, and vocabulary that graduates of quality MBA programs are expected to know. Although the course is problem oriented, it is also analytical and theoretical to the extent that is necessary in order to develop correct insights and practical understanding of topics presented.

### REQUIRED TEXTBOOK

- *Statistics for Managers using Microsoft Excel, 8<sup>th</sup> Edition, David M. Levine, David F. Stephen, Kathryn A. Szabat*

Earlier editions, such as the seventh or sixth edition, can be used as well. In addition, supplementary material will be available on D2L. Notes for mathematics of linear, quadratic, exponential, and logarithmic functions covered in the first week of class.

### SOFTWARE

Excel is the main software for the course. If you do not have access to Excel, it is available in DePaul's computer labs (six Loop locations and six Lincoln Park locations). In addition, enrolled students may download Microsoft Office 365 ProPlus without charge (download the desktop version).

### OUTCOMES

One fundamental objective of this course is to think like a data analyst or data scientist. We are constantly bombarded with figures, claims, and interpretations, but we need to be discerning so that we are not misled by what we see. This course will not be merely a test on your ability to compute. Rather, it will be a training of your ability to find possible interpretations of the information you receive.

Business Analytics Tools assumes no prior knowledge of statistics but does assume sound knowledge of algebra. Statistical concepts and methods are presented in a manner that emphasizes understanding the

principles of data analysis rather than theory. Much of the course will be devoted to discussions of how statistics is commonly used in data analytics. There are two major parts to this course - both of which will rely on the use of Excel:

- I. **Descriptive Statistics (describing data).** This includes the use of graphical and numerical summaries to describe the distribution of a variable, the relationship between two variables, and data production, in order to learn how to collect data from samples that are representative of the whole population and avoid common sources of biases.
- II. **Inference and hypotheses (draw conclusions based on assumptions).** Using the language of probability and the properties of descriptive statistics computed from a random sample, we will learn to draw conclusions about the population of interest, based on our random sample, and attach a measure of reliability to them.

## OBJECTIVES

By the end of this course students should be able to do the following:

- Distinguish between a population and a sample.
- Distinguish between a parameter and a statistic.
- Identify the level of measurement (nominal, ordinal, interval, ratio) of a set of data.
- Recognize the importance of good sampling methods.
- Calculate measures of central tendency such as the mean, median, mode, and midrange.
- Calculate measures of variation by finding the standard deviation, variance, and skewness.
- Compare individual values by using z-scores.
- Describe data using frequency tables, histograms, and scatter plots.
- Describe the characteristics of a normal probability distribution.
- Estimate a population mean by calculating a confidence interval.
- Use the two fundamental rules of probability: the rule of addition and the rule of multiplication.
- Compute z-scores and t-stats.
- Distinguish between a one-tailed and a two-tailed statistical test.
- Identify and describe possible errors in hypothesis testing.
- Use and interpret statistical analyses like correlation coefficients, T-tests, ANOVA tables, and linear regression output.

The students' problem sets, exams, and final project are the assessment tools used to evaluate their progress with the above objectives.

## GRADE CRITERIA

Assessment	Weighted Percentage
Weekly Problem Sets	40%
Exam 1	15%
Exam 2	20%
Final Project	25%

## GRADE SCALE

Letter Grade	Percentage
A	93.0 or above
A -	90.0 - 92.9
B +	87.0 - 89.9
B	83.0 - 86.9
B -	80.0 - 82.9

C +	77.0 - 79.9
C	73.0 - 76.9
C -	70.0 - 72.9
D +	67.0 - 69.9
D	60.0 - 66.9
F	59.9 or below

## DESCRIPTION OF COURSE ASSIGNMENTS

### Problem Sets

- Problem Sets - Due Sundays by 11:59pm

Weekly Problem Set assignments will be posted on D2L, and they will be due at 11:59pm CT on Sunday nights.

These are multiple choice/numeric responses assignments. You have two (2) attempts at each Problem Set. Your highest score is recorded.

Problem Set solutions will be available at 12:01am CT Monday, so any late submissions will not be allowed once answers are made available unless prearranged with the professor. Please contact me if you become ill or experience an immediate family emergency.

### Exams

- Exam 1 – Due Sunday, October 9<sup>th</sup> by 11:59pm CT.
- Exam 2 – Due Sunday, October 30<sup>th</sup> by 11:59pm CT.

Two (2) Exams will be administered this term.

- **Exam 1** will consist of two parts:
  - PART I - A multiple choice/numeric response component administered via D2L. You will have 105 minutes to complete 35 questions. Excel should be used for calculations on this exam.
  - PART II (Excel) - An Excel-based component that will be completed externally and submitted via the \*Exam 1\* > Exam 1 - Part II (Excel) link on D2L. There is no time limit on this component, but it must be submitted by the due date listed above and on D2L.
  - You will be given a two-week period to complete both parts of Exam 1.
    - Exam 1 opens Monday, September 26<sup>th</sup> at 1:20pm CT.
    - Exam 1 is due Sunday, October 9<sup>th</sup> by 11:59pm CT.
- **Exam 2** will also consist of two parts:
  - PART I - A multiple choice component administered via D2L. You will have 105 minutes to complete 55 questions. This exam will test your understanding of concepts only. There will be NO calculations on this component of the exam and Excel will not be needed for Part I.
    - Respondus LockDown Browser will be required to complete Part I for academic integrity purposes. D2L will ask you to download LockDown Browser before beginning the exam if you have not already downloaded it.
    - You will be given one week to complete Exam 2 - **Part I**.
      - *Part I begins Monday, October 24<sup>th</sup> at 1:20pm CT.*
  - PART II (Excel) - An Excel-based component that will be completed externally and submitted via the \*Exam 2\* > Exam 2 - Part II (Excel) link on D2L. There is no time limit on this component, but it must be submitted by the due date listed above and on D2L.
    - **Part II** will open a week early and you will be given two weeks to complete Exam 2 - Part II (Excel).
      - *Part II begins Monday, October 17<sup>th</sup> at 1:20pm CT.*
  - **Exam 2 - Parts I & II** are both **due Sunday, October 30<sup>th</sup> by 11:59pm** CT.

## FINAL PROJECT

- Final Project – D2L submission by Sunday, November 20<sup>th</sup> by 11:59pm.

The final three weeks of the course will be focused on techniques necessary to complete the Final Project. You can begin working on your Final Project as early as Week 2, however.

Your final project, worth 25% of your grade, will be to perform your own **regression analysis** (among other techniques) and present your findings in written form (recommended 7-11 pages).

You can use any of the cleaned data sets found on D2L for your project, or you can obtain and compile your own data set if you have a unique topic idea you would like to explore.

Said differently, this is a research project that will include the following components:

- Introduction
- Literature Review
- Methodology and Specification
- Descriptive Statistics
- Inferential Statistics
- Analysis
- Conclusion
- Appendix

More information and full instructions can be found on D2L the Final Project content area.

## WORKING AHEAD

Participants may work ahead in modules as the instructor makes them available. Participants who choose to work ahead must understand that grading still occurs after the current week has been completed.

## LATE WORK

Late work will generally not be accepted in this course. Requests for extensions may be submitted in writing (i.e., via email) at least 24 hours prior to the deadline. Requests submitted less than 24 hours prior to, or after, the deadline, will only be considered in extreme circumstances. A penalty for late submission of 10% per day may be applied at the discretion of the instructor. Requests for extensions will be approved or denied at the discretion of the instructor.

## WEEKLY COURSE SCHEDULE

(The instructor reserves the right to change the order of topics covered or content covered in this course. Any additional material will be posted on D2L.)

I. Mathematics			
WEEK	TOPICS	ASSIGNMENTS OPEN	ASSIGNMENTS DUE
<b>Week "0.5"</b> 9/7-9/11	* Functions – Linear, Quadratic, Exponential, Logarithmic Functions	Problem Set "0.5": Sep. 7 <sup>th</sup> @ 1:20pm	Problem Set "0.5": Sep. 11 <sup>th</sup> @ 11:59pm
<b>Week 1</b> 9/12-9/18 ( <i>Session 1</i> )	* Sets, Counting Rules, and Summation Notation	Problem Set 1: Sep. 12 <sup>th</sup> @ 1:20pm	
II. Descriptive Analytics using Statistics			
<b>Week 1</b> <b>(CH 1-2)</b> 9/12-9/18 ( <i>Session 2</i> )	Data Collection and Visualization		Problem Set 1: Sep. 18 <sup>th</sup> @ 11:59pm

<b>Week 2</b> <b>(CH 3)</b> 9/19-9/25	Descriptive Statistics	Problem Set 2: Sep. 19 <sup>th</sup> @ 1:20pm	Problem Set 2: Sep. 25 <sup>th</sup> @ 11:59pm
<b>Week 3</b> <b>(CH 4)</b> 9/26-10/2	* Calculating Probabilities: basic events, unions, and intersections of events * Conditional probability	Problem Set 3: Sep. 26 <sup>th</sup> @ 1:20pm  Exam 1: Sep. 26 <sup>th</sup> @ 1:20pm	Problem Set 3: Oct. 2 <sup>nd</sup> @ 11:59pm
<b>Week 4</b> <b>(CH 5-6)</b> 10/3-10/9	* Discrete Probability Distributions (Bernoulli, Binomial, Poisson Distribution) * Continuous Probability Distributions (Normal and t Distributions)	Problem Set 4: Oct. 3 <sup>rd</sup> @ 1:20pm	Problem Set 4: Oct 9 <sup>th</sup> @ 11:59pm  Exam 1: Oct. 9 <sup>th</sup> @ 11:59pm
<b>Week 5</b> <b>(CH 7-8)</b> 10/10-10/16	* Sampling Distributions and Confidence Interval Estimation	Problem Set 5: Oct. 10 <sup>th</sup> @ 1:20pm	Problem Set 5: Oct. 16 <sup>th</sup> @ 11:59pm
<b>Week 6</b> <b>(CH 9-10)</b> 10/17-10/23	* Hypothesis testing for One Sample * Two Sample Test	Problem Set 6: Oct. 17 <sup>th</sup> @ 1:20pm  Exam 2 - Part II (Excel): Oct. 17 <sup>th</sup> @ 1:20pm	Problem Set 6: Oct. 23 <sup>rd</sup> @ 11:59pm
<b>Week 7</b> <b>(CH 11)</b> 10/24-10/30	* Analysis of Variance and Business Statistics Applications	Exam 2 - Part I: Oct. 24 <sup>th</sup> @ 1:20pm	Exam 2 - Parts I & 2: Oct. 30 <sup>th</sup> @ 11:59pm
<b>III. Predictive Analytics - Regression Analysis</b>			
<b>Week 8</b> <b>(CH 13)</b> 10/31-11/6	* Simple Regression Analysis	Problem Set 7: Oct. 31 <sup>st</sup> @ 1:20pm	Problem Set 7: Nov. 6 <sup>th</sup> @ 11:59pm
<b>Week 9</b> <b>(CH 14-15)</b> 11/7-11/13	* Multiple Regression Analysis and Nonlinear Regression		
<b>Week 10</b> <b>(CH 16)</b> 11/14-11/20	* Time Series Forecasting		Final Project: Sunday, Nov. 20 <sup>th</sup> @ 11:59pm

### CLASS RESOURCES

- Section video lectures
- Excel lectures
- PowerPoint lectures
- Lecture Notes
- Reading assignments

## FREQUENTLY ASKED QUESTIONS

### **Q: Can I use Mac Numbers or Google Sheets in this class?**

**A:** Yes, but not advised. This class is based on formulas and functions in Excel that may not translate directly to Numbers or Sheets. Beyond that, all assignments must be submitted in Excel format. So, the best option is to download the desktop version of Excel for free using your student email address.

### **Q: What kind of time commitment can I expect from this class?**

**A:** This varies by student. GSB519 is one of the more involved courses offered, so the time commitment is greater. Generally, students require 10-12 hours per week.

### **Q: What do you mean by “Business Analytics Tools”?**

**A:** This course is an applied probability and statistics course using Excel to analyze data. We will be exploring concepts like descriptive statistics, inferential statistics, hypothesis testing, regression analysis, and a bit of forecasting. You will not be tested on formulas and academic theory - so, you will not need to memorize these. Our class is theoretical to the extent that is necessary in order to develop correct insights and practical understanding of topics presented.

**Theory and formulas are the foundations of understanding and cannot be completely eliminated from course content.** Simply note that the work we will be doing is mostly applied in nature.

### **Q: Are there guidelines for the final paper and study guides for the exams?**

**A:** Yes. Final paper instructions can be found in the Final Project content area on D2L. Study guides can be found in the exam week’s content area.

### **Q: Can I use my own data set for the project?**

**A:** Yes. Keep in mind that all of the cleaned data sets on D2L are perfectly acceptable, as well.

### **Q: What is the general structure of this class?**

**A:** This course is comprised of two learning components:

(1) Probability & Statistics concepts - Learning and understanding the theoretical concepts of statistical techniques for research and analysis.

(2) Data analysis using Excel - Applying those concepts to business-related data using Excel for research and analysis.

### **Q: How can I get the most out of this online course?**

**A:** See the link below the course schedule.

### **Q: How can I do well in this course?**

**A:** See the link below the course schedule.

### **Q: How should I study for this course?**

**A:** See the link below the course schedule.

## **ZOOM**

Office hours and individual meetings will be available live via Zoom. I will provide a Zoom link in D2L for you to connect. I ask that you switch on your webcam during meetings, as this will make for a richer environment for all of us - but it is not mandatory. Office hours and individual meetings will not be recorded unless otherwise noted prior to or during the meeting at the discretion of those involved. Recorded Zoom videos will only be released to students registered for this section of the course.

Zoom is an enterprise video/web conferencing and collaboration solution for DePaul's faculty, staff, and student employees.

Please download the Zoom client before your first class and read the Zoom instructions.

- Download [Zoom Client](https://depaul.zoom.us/download) (<https://depaul.zoom.us/download>)
- [Zoom Video Tutorials](https://support.zoom.us/hc/en-us/articles/206618765-Zoom-Video-Tutorials) (<https://support.zoom.us/hc/en-us/articles/206618765-Zoom-Video-Tutorials>)
- [Zoom Support FAQ](https://support.zoom.us/hc/en-us/articles/206175806-Top-Questions?flash_digest=0d96b1924dbc68c124d363d5d255d51fda1a78e2) ([https://support.zoom.us/hc/en-us/articles/206175806-Top-Questions?flash\\_digest=0d96b1924dbc68c124d363d5d255d51fda1a78e2](https://support.zoom.us/hc/en-us/articles/206175806-Top-Questions?flash_digest=0d96b1924dbc68c124d363d5d255d51fda1a78e2))

### *Frequently Asked Zoom Questions*

#### **Can I connect from a room system?**

Yes. Zoom will allow you to connect from a room system.

#### **Are there instructions on how to connect to Zoom?**

Yes. You can find them [here](#).

#### **Can I increase the size of the video window, so I can see the professor and classroom in more detail?**

Yes. Complete instructions on how to do this are found [here](#). The quick process is:

1. Click the **swap icon** at the upper right corner of the Zoom window to switch the content for the video feed.
2. Click the icon at the upper right to swap it back or click Switch to Sharing Content.
3. Click **View Options**, then **Side-by-Side Mode** to switch into Side-by-Side Mode.
4. Drag the vertical bar that separates the windows left and right to resize to your preferences.

#### **Help! My computer is not working, how can I connect to the videoconference?**

Zoom supports the PC and macOS operating systems on personal computers, along with room systems. If none of these are available to you, then you can use your smartphone (Android or iOS) to connect as a backup. The experience will not be as good as a desktop computer or room system, but it will allow you to connect. In dire circumstances, or if your microphone and speakers are not working, you can connect via a regular telephone connection.

#### **Do I use the same Zoom meeting ID for all courses at DePaul?**

No - Each DePaul course will have a dedicated meeting ID, but the same meeting ID will be used each week of the course.

## **COMPUTER INSTRUCTION**

Instructions for Microsoft Excel will be given during the lecture component of the course. No prior knowledge is necessary to perform any computational work.

## **ACADEMIC HONESTY**

Work done for this course must adhere to the University Academic Integrity Policy. Violations include but are not limited to the following categories: cheating, plagiarism, fabrication, and academic misconduct.

- Cheating: any action that violates University norms or an instructor's guidelines for the preparation and submission of assignments. Such actions may include using or providing unauthorized assistance or materials on course assignments or possessing unauthorized material during any examination.
- Plagiarism: the representation of another's work as your own. You are to prepare your own homework assignments. Violations may result in the failure of the assignment, failure of the course, and/or additional disciplinary actions.
- Misconduct: this includes, but is not limited to, attempts to bribe an instructor for academic advantage, persistent hostile treatment of, or any act or threat of valance against, an instructor, advisor or other students. Violations may result in additional disciplinary actions by other university officials and possible civil or criminal prosecution.

You may review the Academic Integrity Policy in the Student Handbook or by visiting Academic Integrity at the DePaul University webpage (<http://academicintegrity.depaul.edu>).

### **STUDENTS WITH DISABILITIES**

The Center for Students with Disabilities (CSD) offers reasonable academic accommodations and services to support students. It also serves as a resource to the many university departments that have a responsibility to accommodate students. For more information on the CSD program, you can visit <https://offices.depaul.edu/student-affairs/about/departments/Pages/csd.aspx> or call: 312-362-8002.