

Course Syllabus // Business Analytics I (GB 306)

Instructors

Professor Mukherjee

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All TA office hour locations are TBA and will begin the week of Sept 12.

Course Description

Who is the most likely winner of this fall's presidential election? Are there racial or gender biases in the university admissions process? How much more likely are the Warriors to win the NBA title with Kevin Durant now on their roster? What is the fastest way for planes to board passengers? Answering any of these questions requires a knowledge of analytical methods and familiarity with quantitative reasoning. Further, the explosion of data in recent years makes these skills crucial in modern business.

In this course, you will develop your quantitative intuition through practical application using Excel. Specifically, you will learn how to produce summary statistics in both tabular and visual forms using data. You will also learn the essentials of probability and apply it to decision problems where there is uncertainty. As we develop our learning, we will emphasize hypothesis testing and regression analysis, with an introduction to simulation methods. Throughout this course, we will pay special attention to effectively writing and presenting data analysis.

We will use business cases and blog, journal, and newspaper articles to link the course material to real world settings. The course will be taught in three modules, where Module 1 is taught by Professor Mukherjee, Module 2 is taught by Professor Crabb, and Module 3 is taught by Professor Bavafa. We hope that you will enjoy business analytics as much as we do!

Learning Objectives

By the end of this class, you will:

- Acquire “statistical literacy,” meaning that you can interpret statistics frequently used in current events, industry reports, and so on;
- Distinguish between descriptive and inferential statistics, and apply skills such as data summarization, hypothesis testing, and regression analysis, using Excel;
- Apply the core concepts of probability to decision-making under uncertainty, including an introduction to simulation;
- Synthesize your knowledge with quantitative business cases, completed in teams; and
- Effectively communicate data analyses in written, visual, and oral formats.

Friday Discussions

Discussion sessions will be held each Friday, and attendance is mandatory. In Modules 1 and 3, you will be expected to bring your laptops to every discussion. These sessions will be geared toward providing hands-on training in Excel to help you complete the cases. In Module 2, you will take quizzes testing concepts taught in the course to help prepare you for the exam. These quizzes are not graded but will help you, and us, determine your progress in the course.

Software

We will make extensive use of Microsoft Excel, so please make sure you have the most recent version (available through the University at no cost to you) installed on your computer.

Textbook

There is no required textbook for this course. We will provide you the needed course content during lecture. If you wish to have another resource, however, we will provide you the mapping of the lecture content to relevant sections in the following recommended textbook. We will not assume that you have read the following text in preparing for cases or exams.

Albright and Winston. [*Business Analytics: Data Analysis and Decision Making*](#), 6th Edition (Note: the 5th edition also contains all the relevant content.) Hard copy is available at the bookstore, and copies are also on reserve at the Grainger library.

(Some students also find the following textbook useful as an easy-to-follow resource: Gonick, Larry. [*The Cartoon Guide to Statistics*](#). 1993.)

Exam

There will be one exam held outside of class on the evening of November 14th or 15th (date TBA) at the end of Module 2. You may use a scientific calculator on this exam.

Cases

There will be two cases (in Module 1 and Module 3) that involve application of lecture concepts and Excel analyses to business problems. You will work on these cases in teams of 3 (different teams for each case) formed within discussion, and we will provide you with a dataset with structured guidelines for analysis. Each team will receive a unique, randomized subset of a larger dataset from a real business. Your case submissions will be graded on both the technical accuracy of your analyses and your communication of the results; additionally, we will incorporate peer evaluations to each student's grade. Late submissions will not be accepted, so please make sure to meet the deadlines.

Homework

There is no graded homework in this course. We will, however, post four homework assignments with solutions. We expect you to do these and go over the solutions on your own; the homework assignments will feature problems similar to the cases and exam.

Grading & Key Dates

There are a total of 100 points to be earned in this class, distributed as follows. The cases have multiple deadlines because they are split into parts, each with its own deadline:

	Date	Points
Case I	9/16, 9/23, 9/30 (all 5pm CST)	30
Exam	11/14 or 11/15 (TBA, held outside of class)	40
Case II	11/23, 12/2, 12/13, 12/23 (all 5pm CST)	30

Book Chapters & Reading Assignments

Over the course of the semester, we will cover (at least) all the following materials. We will announce the specific reading assignments at the end of each lecture, but you can obtain a preview by viewing the book chapters covered in the session-by-session plan on page 5.

Albright and Winston, 6th Edition:

- Chapter 1: Introduction to Business Analytics (**all sections**)
- Chapter 2: Describing the Distribution of a Single Variable (**all sections**)
- Chapter 3: Finding Relationships among Variables (**all sections**)
- Chapter 4: Probability and Probability Distributions (**except 4-2e, 4-2f, 4-3b**)
- Chapter 5: Normal, Binomial, Poisson, and Exponential Distributions (**except 5-4b, 5-6**)
- Chapter 6: Decision Making under Uncertainty (**except 6-3, 6-4, 6-6**)
- Chapter 7: Sampling and Sampling Distributions (**all sections**)
- Chapter 8: Confidence Interval Estimation (**except 8-6, 8-7b, 8-9b**)
- Chapter 9: Hypothesis Testing (**except 9-4c**)
- Chapter 10: Regression Analysis: Estimating Relationships (**except 10.6.b, 10.6.c**)
- Chapter 11: Regression Analysis: Statistical Inference (**except 11-3c, 11-6, 11-8c**)
- Chapter 15: Introduction to Simulation Modeling (**except 15-5, 15-2c**)

- Savage, S. "[The flaw of averages.](#)" *Harvard Business Review* (2002)
- Harford, T. "[Big data: A big mistake?](#)" *Significance* (2014)
- Lazer, D., et al. "[The parable of Google Flu: traps in big data analysis.](#)" *Science* (2014)
- Einav, L. and J. Levin. "[Economics in the age of big data.](#)" *Science* (2014) [Parts I, II, VI]
- Schwabish, J.A. "[An economist's guide to visualizing data.](#)" *J. of Economic Perspectives* (2014)
- Gigerenzer, G. "[What are natural frequencies?](#)" *British Medical Journal* (2011)
- Flam, F.D. "[The odds, continually updated.](#)" *The New York Times* 09-29-2014
- Finney, P.B. "[Loading an airliner is rocket science.](#)" *The New York Times* 11-14-2006
- Kim, M. "[Netflix-like predictive model: Hospital systems could pinpoint which patients are most likely to code on their watch.](#)" *The Washington Post* 12-04-2015

Additionally, we frequently distribute extended lecture notes and readings on related current events on Moodle. These files are also required reading.

Laptop Policy

As per WSB policy, the use of personal electronics is not permitted during lecture. That being said, we expect you have a laptop as it is required for several discussion sessions. Please contact us if you do not have one and we can provide guidance on how to borrow one from the library.

Other

All class resources are available on the Moodle website, and course e-mails will be sent via Moodle. You can always check the website for the most up-to-date information.

We are eager to grow our resources of articles, videos, and stories related to business analytics. We occasionally share these resources via our Twitter accounts (Prof. Mukherjee at [@anita_mukherjee](#) & Prof. Bavafa at [@BavafaTerwiesch](#)). Feel free to communicate with us via Twitter and/or e-mail to share articles of interest.

Additional Resources

We have arranged for you to have access the tutoring desk at the Business Learning Center (<http://www.bus.wisc.edu/blc/>). This is a useful resource if you need help with the course material beyond what we can provide.

Your success in this class is important to us. If there are circumstances that may affect your performance in this class, please let us know as soon as possible so that we can work together to develop strategies for adapting assignments to meet both your needs and the requirements of the course. The McBurney Disability Resource Center provides resources for students with disabilities. You will need to provide documentation of disability to them in order to receive official university services and accommodations, but please talk to us if you have any concerns.

Course Schedule (tentative)

Session	Topic	Book Chapter	Date
MODULE 1 (Professor Mukherjee)			
1	Introduction & Orientation: Data-Driven Performance in Organizations	1, 2	9/7
D	Discussion: Case Introduction (bring laptops)	-	9/9
2	Exploring Data I: Basic Summarization & Pivot Tables	2	9/12
3	Exploring Data III: Data Visualization	2	9/14
D	Discussion: Working with Pivot Tables (bring laptops)	-	9/16
4	Characterizing Relationships Between Variables	3	9/19
5	Probability Puzzles That Matter	4	9/21
D	Discussion: Plotting in Excel (bring laptops)	-	9/23
6	The Fundamentals of Bayesian Updating I	6	9/26
7	The Fundamentals of Bayesian Updating II	6	9/28
D	Discussion: Probabilities in Excel (bring laptops)	-	9/30
8	Case Review & Benefits and Concerns about Big Data	-	10/3
MODULE 2 (Professor Crabb)			
9	The Language of Random Variables	4	10/5
D	Discussion: Case Review	-	10/7
10	Uniform and Binomial Distributions	4, 5	10/10
11	The Normal Distribution	5	10/12
D	Discussion: Quiz 1	-	10/14
12	Decision Making under Uncertainty I: Decision Trees	6	10/17
13	Decision Making under Uncertainty II: Risk Profiles	6	10/19
D	Discussion: Quiz 2	-	10/21
14	Generalizing from Samples	7	10/24
15	Central Limit Theorem	7	10/26
D	Discussion: Quiz 3	-	10/28
16	Making Statements with Precision I: Confidence Intervals	8	10/31
17	Making Statements with Precision II: Confidence Intervals	8	11/2
D	Discussion: Quiz 4	-	11/4
18	Thinking Like a Data Scientist II: Hypothesis Testing	9	11/7
19	Thinking Like a Data Scientist I: Hypothesis Testing	9	11/9
D	Discussion: Exam Review	-	11/11
20	Exam (held outside of class on Nov 14 or 15, date/time TBA)	-	11/15
MODULE 3 (Professor Bavafa)			
21	Building Business and Economic Models I: Regression Basics	10	11/16
D	Discussion: Case Introduction (bring laptops)	-	11/18
22	Building Business and Economic Models II: Regression Basics	10	11/21
<i>Thanksgiving Break</i>			
23	Building Business and Economic Models III: Regression Basics	10	11/28
24	Hands-On Regression Analysis	10	11/30
D	Discussion: Regression Lab (bring laptops)	-	12/2
25	Using Data to Build Your Own Business: Introduction to Simulation	15	12/5
26	Using Data to Build Your Own Business: Building a Simulation Model	15	12/7
D	Discussion: Simulation Lab (bring laptops)	-	12/9
27	Using Data to Build Your Own Business: Applications of Simulation	15	12/12
28	Case Review & Frontiers of Business Analytics	-	12/14