



## STA 371G

UNIQUE NUMBERS: 04610, 04620

STATISTICS AND MODELING

SPRING 2014

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<b>Course Web Page</b>	via Canvas

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### Course Objectives

This course introduces the techniques of Statistical Analysis, Decision Analysis and Simulation, and discusses their application to problems in Business. The techniques taught in the course will also be useful in performing analysis in most other BBA courses.

The Statistical Analysis part of the course focuses on determining the existence of relationships between variables and the quantification of such relationships. The main tool we will use to determine the existence of relationships between variables in data and to quantify the strength of the relationships is Regression Analysis. We will cover examples ranging from the link between CEO performance and company performance, to stock returns of a particular company vs. the entire market, to links between house prices and house characteristics such as size, number of rooms and lot size. In addition we will analyze time series and identify the existence of trends and patterns in data.

Decision Analysis is a framework that enables you to make decisions that are consistent with an objective, in the face of uncertainty. We will learn to evaluate alternatives, and to determine the value of acquiring information. Examples we will cover range from simple decisions, such as accepting or rejecting a project, to complicated ones such as the quantification of the damage to the value of a project due to conflicts between shareholders and bondholders.

Simulation is a procedure for quantifying the impact of multiple interacting sources of uncertainty on an outcome of interest. Understanding the distribution of the possible outcomes allows both for a better understanding of the risk involved in a particular project, as well as the identification of the inputs that are most influential in the project's value. Once these influential inputs are identified, decisions can be made regarding the benefit of controlling the outcome by exploring alternatives. Our examples will range from the valuation of oil rigs, oil fields and electricity generators to determining the viability of real estate development projects.

By the end of the course, you should feel comfortable analyzing data and building models to solve particular problems. You should also be able to identify the impact changes in the underlying relationships would have to the outcome of a model, as well as determining whether to collect additional information prior to taking a decision.

While this course will primarily enhance your knowledge and understanding of statistical analysis and

allow you to build models appropriate to a business problem, it will also, through class discussion, informal study groups, and formal group homework, strengthen your communication and collaboration skills. Understanding how to analyze data will also provide you with the skills to identify the misuse of data analysis, while the use of examples in international settings will provide some appreciation of global business practices.

## Materials Required

None – Course package, including notes, and past exams available online.

## Optional - Recommended

Data Analysis and Decision Making with Microsoft Excel, by Albright, Winston, Zappe, 4<sup>th</sup> edition.  
Please avoid installing the software that comes with the book – an alternative, professional, version of the software will be available in class.  
Student Solution Manual for selected problems from the textbook, by Kelly B. Nichols-Voss.

## Grading

	Points
Homework	25
Midterm 1	up to 25
Midterm 2	up to 25
Midterm 3	up to 25
Final	up to 75

There will be three midterm exams for this class.

There is also the possibility of a comprehensive final exam.

If you take all three midterm exams and are satisfied with your performance you are not required to take the final exam.

If you miss more than one midterm exam the weight will be added to the final exam.

You are allowed to take all the midterm exams as well as the final. If you take one or more midterm exams, as well as the final exam, your grade will be determined in the following way:

- your grade for the final exam will count toward any midterm exam you missed
- if your grade for the final exam is lower than your grade in a midterm exam, you will keep the grade for the midterm exam
- if your grade for the final exam is above your grade in a midterm exam, your midterm grade will be adjusted midway between the midterm grade and the final grade.
- For example, if you received 80 in the first midterm, 85 in the second midterm, missed the third midterm and received 82 in the final exam, your third midterm grade will be set to 82, your first midterm grade will be adjusted to 81, while your third midterm grade will stay at 85.

There is no predetermined grade distribution for this class. According to the BBA grading guidelines, the average GPA will be between 3.0 and 3.2

## Homeworks

Half of the homework assignments will be group assignments and only one answer needs to be turned in for all the students. The remaining assignments will be individual and each student will need to work and submit a separate answer.

Each group should have at most 4 members.

All homeworks will be due at the beginning of the class on the due date. All homeworks should be turned in electronically through the class website on Canvas.

Since submission is electronic, I will not accept any late homeworks.

I will drop your lowest homework grade at the end of the semester.

### **Exams**

Midterms #1, #2, #3, on the evenings of Tuesday February 18, Tuesday April 1, and Tuesday April 29, at a location to be determined.

The final exam will be at the location/date/time specified by the course schedule.

All exams will be open-book, open-notes.

You will need to bring a laptop for each exam with the software used in the class already installed.

### **Computers and Communication devices**

By the nature of the material, I will be using a computer in every session. You are welcome to follow along with your personal computer

While the use of computers enhances the learning environment, they (as well as communications devices such as cellphones, tablets, and iPods) can also be a distraction if used inappropriately. In particular, when students are surfing the web, checking and posting updates on Facebook and Twitter, responding to e-mail, instant messaging each other, and otherwise not devoting their full attention to the topic at hand they are doing themselves and their peers a major disservice. Those around them face additional distraction. Fellow students cannot benefit from the insights of the students who are not engaged. If you engage in behavior described above I will ask you to leave the classroom.

The use of computers in the exams will be discussed in class.

## Important Notifications

### **Students with Disabilities**

Students with disabilities may request appropriate academic accommodations from the Division of Diversity and Community Engagement, Services for Students with Disabilities, 512-471-6259, <http://www.utexas.edu/diversity/ddce/ssd/>.

### **Religious Holy Days**

By UT Austin policy, you must notify me of your pending absence at least fourteen days prior to the date of observance of a religious holy day. If you must miss a class, an examination, a work assignment, or a project in order to observe a religious holy day, you will be given an opportunity to complete the missed work within a reasonable time after the absence.

### **Policy on Scholastic Dishonesty**

The McCombs School of Business has no tolerance for acts of scholastic dishonesty. The responsibilities of both students and faculty with regard to scholastic dishonesty are described in detail in the BBA Program's Statement on Scholastic Dishonesty at <http://www.mcombs.utexas.edu/BBA/Code-of-Ethics.aspx>. By teaching this course, I have agreed to observe all faculty responsibilities described in that document. By enrolling in this class, you have agreed to observe all student responsibilities described in that document. If the application of the Statement on Scholastic Dishonesty to this class or its assignments is unclear in any way, it is your responsibility to ask me for clarification. Students who violate University rules on scholastic dishonesty are subject to disciplinary penalties, including the possibility of failure in the course and/or dismissal from the University. Since dishonesty harms the individual, all students, the integrity of the University, and the value of our academic brand, policies on scholastic dishonesty will be strictly enforced. You should refer to the Student Judicial Services website at <http://deanofstudents.utexas.edu/sjs/> to access the official University policies and procedures on scholastic dishonesty as well as further elaboration on what constitutes scholastic dishonesty.

### **Campus Safety**

Please note the following recommendations regarding emergency evacuation from the Office of Campus Safety and Security, 512-471-5767, <http://www.utexas.edu/safety>:

Occupants of buildings on The University of Texas at Austin campus are required to evacuate buildings when a fire alarm is activated. Alarm activation or announcement requires exiting and assembling outside.

Familiarize yourself with all exit doors of each classroom and building you may occupy.

Remember that the nearest exit door may not be the one you used when entering the building.

Students requiring assistance in evacuation should inform the instructor in writing during the first week of class.

In the event of an evacuation, follow the instruction of faculty or class instructors.

Do not re-enter a building unless given instructions by the following: Austin Fire Department, The University of Texas at Austin Police Department, or Fire Prevention Services office.

Behavior Concerns Advice Line (BCAL): 512-232-5050

Further information regarding emergency evacuation routes and emergency procedures can be found at: <http://www.utexas.edu/emergency>.

## Schedule

The information provided below lists the topics we will cover during the semester. The material is covered, in sequential order, in the notes posted on the course website and I encourage students to go over the material for each class ahead of time. The schedule is tentative and subject to change.

<b><u>Date</u></b>	<b><u>Topic</u></b>
Jan. 13	Introduction, StatTools Example: CEO salaries
Jan. 15	Review of normal distribution, sums of random variables Example: Filling Coca Cola bottles Example: Pre-ordering toys
Jan. 22	Introduction to regression Example: CEO performance vs. compensation Example: returns of Amazon vs. S&P 500
Jan. 27	Measuring the quality of regression: $R^2$ and Example: Pizza sales
Jan. 29	Violations of regression assumptions, outliers Example: Voter fraud Example: Alabama Power
Feb. 3	Multiple regression, Dummy variables Example: Truck maintenance Example: Salary determinants
Feb. 5	Model selection: backward regression Example: Sales prices for houses Example: Salary example, continued
Feb. 10	Regression: Review examples
Feb. 12	Regression: Review examples
Feb. 17	1 <sup>st</sup> midterm exam review
<b>Feb. 18</b>	<b>1<sup>st</sup> midterm exam</b>
Feb. 19	Solutions to 1 <sup>st</sup> midterm
Feb. 24	Time series analysis: no seasonality Example: Detergent sales: moving average, exponential smoothing Example: Detergent sales: using regression
Feb. 26	Time series analysis: seasonality Example: Detergent sales: seasonal indices Example: Detergent sales: using regression with dummy variables
Mar. 3	Introduction to Decision Analysis Example: Drilling for oil
Mar. 5	Decision analysis II Example: Insulating grapefruit Example: TV Pilot
Mar. 17	Decision analysis III Expected Value of Perfect Information, Expected value of Sample Information Example: EVPI – Drilling for Oil Example: EVSI – Drilling for Oil
Mar. 19	Decision analysis IV Example: Ski Resort
Mar. 24	Decision analysis V

Mar. 26	Example: Sugar Plant Decision analysis VI
Mar. 31	Example: Agency Problem 2 <sup>nd</sup> midterm exam review
<b>Apr. 1</b>	<b>2<sup>nd</sup> midterm exam</b>
Apr. 2	Solutions to 2 <sup>nd</sup> midterm
Apr. 7	Introduction to simulation Example: Drilling for oil
Apr. 9	Simulation II Example: Investing for retirement
Apr. 14	Example: Choosing capacity Simulation III Example: Market share
Apr. 16	Example: Consumer satisfaction Simulation IV Example: Battery replacement
Apr. 21	Simulation V Example: Oil rig and oil field valuation
Apr. 23	Simulation VI Example: Electricity generator valuation
Apr. 28	Review for 3 <sup>rd</sup> midterm exam
<b>Apr. 29</b>	<b>3<sup>rd</sup> midterm exam</b>
Apr. 30	Solutions to 3 <sup>rd</sup> midterm