THE UNIVERSITY OF TEXAS AT AUSTIN

McCOMBS Texas BBA

STA 371G

STATISTICS AND MODELING

SPRING 2013

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Course Web Page	via Blackboard

Course Objectives

The focus of this course is on learning how to manage uncertainty in business decisions through the use of quantitative models. The topics covered include regression models, time series forecasting models, decision analysis and simulation, with a strong emphasis on how to apply these techniques to real-world problems that arise in business. The techniques taught in the course will also be useful in performing analysis in other BBA courses.

Regression analysis is one of the most powerful methods in statistics. It is particularly useful for determining the relationships between variables and using these relationships to forecast future observations. You will learn how to apply a regression model to real-world data using Excel, test the validity of the model with the available data, draw inferences from the model, and summarize the uncertainty of the inferences. Time series forecasting models are used to forecast future observations of time series data. An example of time series data is the monthly sales of a company. The fundamental idea of time series forecasting models is to use the pattern in the past history of the data (which might include trend, seasonal and/or cyclical components) to forecast future observations. These models also provide a valuable method for quantifying the uncertainty associated with the forecasts.

Decision analysis is a framework that enables you to make decisions that are consistent with an objective in the face of uncertainty. This framework provides a method to evaluate alternatives and to determine the value of acquiring various types of information. Simulation is a computation-based 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.

By the end of the course, you will be able to build models to solve real-world business problems. This involves choosing the appropriate model, performing the correct analysis, validating the model, and drawing the appropriate conclusions.

Materials

Required: Course packet available at University Duplicating

Optional: Custom Textbook: The custom book contains chapters 4-7, 10-12, 15 and 16 from *Data Analysis and Decision Making with Microsoft Excel* (4th edition) by Albright, Winston and Zappe

Software: Excel and the Excel Add-ins Precision Tree and @Risk from the Palisades Decision Tools Suite. The Decision Tools Suite is available for download at http://www.mccombs.utexas.edu/Tech/Computer-Services/COE.aspx − Click on Decision Tools Standard 5.7 near the bottom of the page.

Course Policies

Grading

The percentage weights associated with your homework, two midterm exams and the final exam are:

	Percentage
Homework	20%
Midterm exam #1	20%
Midterm exam #2	20%
Final exam	40%

There is no predetermined grade distribution for this class. Your lowest homework grade will be dropped when computing the contribution of your homework scores to your final grade.

Homework

- You will receive homework assignments throughout the semester. Although you may discuss the homework problems and solutions among yourselves, every student is expected to hand in a set of solutions that he or she alone has prepared.
- You must show a complete solution (all steps and calculations) to receive credit for a homework problem. However, you do not need to submit computer output used to obtain an answer.
- If you believe a mistake is made in the grading of your homework, you should write a description of the error that you believe was made, attach it to the homework, and resubmit the homework within *one week* of the day it was returned.
- Please check Blackboard regularly to make sure all grades are correctly recorded.

Exams

- The first midterm exam will be given from 6-9pm on Monday, February 25 and the second midterm exam will be given from 6-9pm on Monday, April 8. If you miss either midterm exam for any reason, the weight of the missed exam will be added to the final exam.
- If you believe a mistake is made in the grading of your midterm, you should write a description of the error that you believe was made, attach it to the midterm, and resubmit the exam within *one week* of the day it was returned.
- The final exam will be given during the University's final exam period. The specific date is determined by the University.
- You may bring one 8½ × 11 inch page of notes and formulas to the exam.
- You should bring a blue book to the midterm and final exams.
- You should bring a calculator to the midterm and final exams.

Helpful Hints

- You are responsible for material covered in class, whether or not it is in the text.

Quantitative Reasoning Flag

This course carries the Quantitative Reasoning flag. Quantitative Reasoning courses are designed to equip you with skills that are necessary for understanding the types of quantitative arguments you will regularly encounter in your adult and professional life.

McCombs Classroom Professionalism Policy

The highest professional standards are expected of all members of the McCombs community. The collective class reputation and the value of the learning experience hinges on this.

Faculty are expected to be professional and prepared to deliver value for each and every class session. Students are expected to be professional in all respects.

The classroom experience is enhanced when:

- **Students arrive on time.** On time arrival ensures that classes are able to start and finish at the scheduled time and enhances learning by reducing avoidable distractions.
- **Students minimize unscheduled personal breaks.** The learning environment improves when disruptions are limited.
- **Laptops will not be used in class.** It is not necessary to bring a laptop to class. We will make extensive use of the computer in homework assignments but you will not need to use one in class. You may use a laptop to take notes if you want to although I would recommend against it. There will be some notation used in class (e.g. a few Greek letters and summation signs) that can be difficult to type into a computer unless you are familiar with special symbols.
- **Phones and wireless devices are turned off.** Please be sure to turn off your phones and wireless devices before class begins.

Academic Dishonesty

I have no tolerance for acts of academic dishonesty. Such acts damage the reputation of the school and the degree and demean the honest efforts of the majority of students. The minimum penalty for an act of academic dishonesty will be a zero for that assignment or exam.

- **As specific guidance for this course**, you may not use the homework answers of students in previous classes in any way to assist you in completing the homework questions this year. It is a violation of the honor code in this class to use such assistance.

Religious Holy Days

Please 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 or a homework assignment 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.

Students with Disabilities

Upon request, the University of Texas at Austin provides appropriate academic accommodations for qualified students with disabilities. Services for Students with Disabilities (SSD) is housed in the Office of the Dean of Students, located on the fourth floor of the Student Services Building. Information on how to register, downloadable forms, including guidelines for documentation, accommodation request letters, and releases of information are available online at http://deanofstudents.utexas.edu/ssd/index.php. Please do not hesitate to contact SSD at (512) 471-6259, VP: (512) 232-2937 or via e-mail if you have any questions.

Syllabus

The information provided below gives the reading assignments for the different topics we will cover during the semester. All page numbers refer to the chapters in the customized book based on *Data Analysis & Decision Making with Microsoft Excel* by Albright, Winston and Zappe. The *Topic Summary Notes* and *Computer Slides* are in the course packet and on the course Blackboard site.

Date	Topic	Reading Assignment
Monday, January 14	Introduction Probability concepts Normal distribution	pp. 156-158, 166-168, 211-230; Section 1 of the *Computer Slides*; *Topic Summary Note: Probability Concepts and Normal Distributions*
Wednesday, January 16		
Wednesday, January 23	Simulation Waldorf Property case Genzyme/GelTex case	pp. 917-972 Sections 2 and 3 of the *Computer Slides*
Monday, January 28		
Wednesday, January 30		
Monday, February 4	Estimation and sampling distributions	pp. 352-354, 366-373; Section 4 of the *Computer Slides*; *Topic Summary Note: Estimation and Sampling Distributions*
Wednesday, February 6	Simple linear regression	pp. 529-535, 542-547, 603-606; Sections 5-7 of the *Computer Slides*; *Topic Summary Note: Regression Model and Its Estimation*
Monday, February 11		
Wednesday, February 13		
Monday, February 18	Multiple regression	pp. 553-556; Sections 8-9 of the *Computer Slides*
Wednesday, February 20	Categorical explanatory variables	pp. 560-566; Section 10 of the *Computer Slides*
Monday, February 25	Review for evening exam	----------
Wednesday, February 27	Regression model for nonlinear relationships	pp. 571-574; Section 11 of the *Computer Slides*; *Topic Summary Note: Nonlinear Relationships*
Monday, March 4	Correlation and covariance	pp. 106-111, 540-542; Section 12 of the *Computer Slides* *Topic Summary Note: Correlation and Covariance*
Wednesday, March 6	Diagnostic tests for the assumptions of the regression model	pp. 644-647; Section 13 of the *Computer Slides*
Monday, March 18	Explanatory power of the regression model	pp. 549-551, 556-558; Sections 14-15 of the *Computer Slides*; *Topic Summary Note: Interpreting and Estimating Var(ε) in a Regression Model*; *Topic Summary Note: Computing and Interpreting R^2*

Wednesday, March 20	Outliers/Forecasting using a regression model	pp. 64-65, 638-643; Section 16 of the *Computer Slides*; pp. 648-651; Section 17 of the *Computer Slides*
Monday, March 25	Forecasting: Modeling trend, seasonality and short-term patterns	pp. 671-676, 687-689, 699-702, 729-732; Section 18 of the *Computer Slides*; *Topic Summary Note: Forecasting Sales of SPSS Computer Manuals*
Wednesday, March 27		
Monday, April 1	Forecasting: Modeling increasing volatility	Section 19 of the *Computer Slides*
Wednesday, April 3	Simulation in forecasting models: Napa Valley Winery case	*Computer Slides* still to come
Monday, April 8	Review for evening exam	----------
Wednesday, April 10	Determining the quality of an estimator in a regression model	Section 20 of the *Computer Slides*; *Topic Summary Note: Measuring the Quality of the Estimate of* β
Monday, April 15	Hypothesis testing in a regression model	pp. 610-611, 620-624; Section 21 of the *Computer Slides*; *Topic Summary Note: Hypothesis Testing in Regression*
Wednesday, April 17	Decision analysis and one-way sensitivity analysis	pp. 273-301 Section 22 of the *Computer Slides*
Monday, April 22		
Wednesday, April 24	Expected value of perfect information	pp. 307-321 Section 23 of the *Computer Slides*
Monday, April 29	Expected value of imperfect information and two-way sensitivity analysis	pp. 301-306 Section 24 of the *Computer Slides*
Wednesday, May 1		

Simulation will be used throughout the semester and incorporated into several regression topics, especially forecasting, and will be used in multiple case problems, including the Genzyme/Geltex Pharmaceuticals, Oakland A's (B) and Napa Valley Winery cases.

Decision analysis will also be used in several case problems, including the Hawthorne Plastics and Freemark Abbey cases.

University Mandated Syllabus 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.mccombs.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.