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

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## Course Objectives

The focus of this course is on learning how to manage uncertainty in financial applications 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 most other BBA courses. The course is focused on Finance applications and is a prerequisite for the Quantitative Finance track for Finance majors.

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 SAS, 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. 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 computational 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. We will build models by using Excel and an Excel add-in, @Risk.

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:

None – I will make notes available on the course website.

### Recommended:

*Applied Regression Analysis: A Second Course in Business and Economic Statistics* (4<sup>th</sup> edition) by Terry E. Dielman.

Chapters on Decision Analysis and Simulation of *Data Analysis & Decision Making* by Albright, Winston and Zappe

*The Little SAS Book* (3<sup>rd</sup> edition), by Lora Delwiche and Susan Slaughter

*SAS Statistics by Example*, by Ron Cody.

## Grading

Your grade in the course will be determined as follows:

	<u>Percentage</u>
Homework	25%
Midterm #1 – up to	25%
Midterm #2 – up to	25%
Midterm #3 – up to	25%
Class project – up to	25%

There will be three midterm exams for this class.

There is also the possibility of a group project.

If you take all three midterm exams you are not required to do a project.

If you do a project, your grade for the project can substitute for your worse midterm exam.

If you miss one midterm exam you can make up for it with a group project.

There is no predetermined grade distribution for this class. I will follow the BBA guidelines for the course average.

## Homeworks

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

All homeworks will be due at the beginning of the class they were assigned for. 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

Midterm #1 will be in the MOD lab, on Monday, February 17<sup>th</sup> from 7-9 pm.

Midterm #2 will be in the MOD lab, on Monday, March 24<sup>th</sup> from 7-9 pm.

Midterm #3 will be in the MOD lab, on Monday, April 28<sup>th</sup> from 7-9 pm.

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

**Group project**

You can do a group project using the methods we cover in the class.

There can be at least 2 and at most 3 people in each group.

I would be glad to help you decide on a project, but it should be something you are interested in. You should choose your topic and email me a one paragraph description by 2 pm on Wednesday, March 5<sup>th</sup>. This allows you enough time to collect and analyze the data. I will not accept project proposals after March 5<sup>th</sup>.

Your final report is due by midnight, on Sunday, May 4<sup>th</sup>. The report should be 8-12 pages long and should include a summary describing the goal of the project with a brief overview of the results, a section describing the data and their collection, a section describing the analysis and the results, a short concluding section. You should also provide me with your data and the code for your analysis.

If you do a project, you will need to present your results in front of me in a 5-8 minute presentation, on the date/time scheduled for the final exam.

**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 cell phones, 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.

<b>Important Notifications</b>
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**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>.

## The BHP Honor Code

We, the students of the Business Honors Program (BHP), have adopted this code as an expression of our commitment to ethical standards. We believe honor and trust are essential to a superior academic experience and continued professional success. It is intended to unite us and create an atmosphere of trust and mutual respect. Each student must abide by and defend the code.

Therefore we resolve that:

We will abide by University of Texas policies for academic integrity.

We will neither give nor receive unauthorized aid during completion of academic requirements.

We will not act to gain any unfair advantage as BHP students or to cause academic or professional harm to another student.

We will not misrepresent facts or qualifications at any time.

We will not purposely obtain or possess property belonging to the University or another student without consent, nor will we deny other students access to university resources

We will treat all individuals fairly and with dignity regardless of race, gender, creed, age, disability, national origin, and sexual orientation

## BHP Faculty Pledge

We, the faculty of the Business Honors Program (BHP), pledge our support of the BHP Honor Code because we too believe that honor and trust are essential to a superior academic experience. We join in the students' commitment to ethical standards. We recognize the code is intended to bind us together, creating an atmosphere of trust and mutual respect. Commitment to these ideals is important not only in the academic environment, but is also vital to professional success. Thoughtful consideration of these issues will better prepare our students to face complex ethical discussions in the business community.

We recognize that all students in the BHP are bound by this honor code. Students are expected to maintain absolute integrity, and to uphold and defend a high standard of honor in all scholastic work. Each student is expected to compete fairly and ethically with his or her peers. We believe the BHP and all students in it are harmed by unethical behavior by any student.

Therefore we resolve that:

1. We support the policies of the University of Texas concerning academic integrity and will not tolerate acts of scholastic dishonesty.
2. We will provide guidance on the application of these principles to specific assignments and expect every student to follow all guidelines given for a specific assignment.
3. We acknowledge that both giving and receiving unauthorized aid during completion of any academic requirement, no matter how small, is cheating.
4. We expect our students will not act to gain any unfair advantage or to cause academic or professional harm unfairly to another student.

5. Unless collaboration is expressly permitted, assignments submitted for credit will be work done independently of honors students and all others.
6. In all activities, including but not limited to registration and placement, we expect our students not to misrepresent facts or qualifications at any time.
7. We also expect our students will not purposely obtain or possess property belonging to the University or another student without consent, nor will they deny other students access to university resources (e.g., libraries and career placement materials).
8. If we suspect a violation of this code has occurred, we will be diligent in identifying the student or students involved and will act consistently with the policies of the University of Texas concerning academic dishonesty.
9. Given the importance of academic honesty, we will endeavor to avoid ambiguity and assist students in upholding the Honor Code.

## 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.

<u>Date</u>	<u>Topic</u>
Jan.13	Introduction: WRDS and SAS Introduction, Review of the normal distribution, QQ plot <i>Example: Returns of S&amp;P 500</i>
Jan. 15	Linear Regression Model <i>Example: AMZN vs. S&amp;P</i> <i>Example: Mortgage rate vs. LTV</i>
Jan. 22	Hypothesis Testing in a Regression Model <i>Example: Mortgage rate vs. LTV</i>
Jan. 27	Hypothesis Testing in a Regression Model <i>Example: Performance of Mutual Fund Managers</i>
Jan. 29	Prediction of expected and actual values in regression <i>Example: Predicting returns for AMZN</i>
Feb. 3	Dummy Variables and Multiple Regression <i>Example: Mortgage rate vs. LTV, cont.</i>
Feb. 5	Measuring the quality of regression <i>Example: Mortgage rates vs. FICO scores</i>
Feb. 10	Violations of regression assumptions <i>Example: Electricity Usage vs. Temperature</i> <i>Example: Capital Asset Pricing Model</i>
Feb. 12	Model Selection – Backward Regression <i>Example: changes in the AAA Rate vs. various other interest rates</i>
Feb. 17	Review for 1 <sup>st</sup> midterm exam
<b>Feb. 17</b>	<b>1<sup>st</sup> midterm exam (7-9 pm MOD Lab)</b>
Feb. 19	Solutions of 1 <sup>st</sup> midterm exam
Feb. 24	Qualitative Dependent Variables: Logistic Regression <i>Example: Determining LTV ratios in commercial mortgages</i>
Feb. 26	Qualitative Dependent Variables: Multinomial Logistic Regression <i>Example: Predicting the reason stated for CEO departure</i>
Mar. 3	Time Series Analysis Introduction: moving averages, exponential smoothing <i>Example: Detergent sales</i>
Mar. 5	Time Series Analysis continued: seasonality – Winters method <i>Example: Detergent sales</i>
Mar. 17	Time Series Analysis continued: regression models

*Example: Detergent sales*

- Mar. 19 Time Series Analysis review  
*Example: Turkey sales*
- Mar. 24 Review for 2<sup>nd</sup> midterm exam
- Mar. 24 2<sup>nd</sup> midterm exam (7-9 pm MOD Lab)**
- Mar. 26 Solutions of 2<sup>nd</sup> midterm exam
- Mar. 30 Introduction to Decision Analysis  
*Example: Drilling for Oil*
- Apr. 2 Decision Analysis II  
*Example: Insulating grapefruit*  
*Example: TV Pilot*
- Apr. 7 Decision Analysis III – Value of information  
*Example: EVPI – Drilling for Oil*  
*Example: EVSI – Drilling for Oil*  
*Example: Ski Resort*
- Apr. 9 Decision Analysis IV  
*Example: Sugar Plant*  
*Example: Agency Problem*
- Apr. 14 Simulation and Modeling I  
*Example: Drilling for Oil*  
*Example: Investing for Retirement*
- Apr. 16 Simulation and Modeling II  
*Example: Choosing Capacity*  
*Example: Valuing Customer Satisfaction*
- Apr. 21 Simulation and Modeling III  
*Example: Electricity Generator Valuation*
- Apr. 23 Simulation and Modeling IV  
*Example: Valuation of Oil Fields and Oil Rigs*  
*Example: Market Share*
- Apr. 28 Review for 3<sup>rd</sup> midterm exam
- Apr. 28 3<sup>rd</sup> midterm exam (7-9 pm MOD Lab)**
- Apr. 30 Solutions of 3<sup>rd</sup> midterm exam