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

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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, 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.

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 16, 17 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

*Learning SAS in the Computer Lab* (3<sup>rd</sup> edition) by Rebecca J. Elliott and Christopher H. Morrell.

## 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%
 Final – up to	 75%

- There will be three midterm exams for this class.
- There is also the possibility of a comprehensive final exam and a group project.
- If you take all three midterm exams and are satisfied with your performance you are not required to take the final exam or do a project.
- If you decide to 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.
- If you miss more than one midterm exam (or miss one midterm exam and do not do a group project), 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 for 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. In the past I adjusted to course average to match the grade average that the students in the class received in STA 309/309H.

## 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.
- All homeworks will be due at the beginning of the class following the one they were assigned. All homeworks should be turned in electronically through the class website on Blackboard.
- 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 Tuesday, February 21<sup>st</sup> from 7-9 pm.
- Midterm #2 will be in the MOD lab, on Tuesday, March 27<sup>th</sup> from 7-9 pm.
- Midterm #3 will be in the MOD lab, on Tuesday April 24<sup>th</sup>, from 7-9 pm.
- The final exam will be in the MOD lab, on Wednesday, May 9<sup>th</sup>, 9 am -12 pm.
- All exams will be open-book, open-notes.

## Group project

You are welcome to do a group project using the methods we cover in the class.

- There can be 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 chose your topic and email me a one paragraph description by 5 pm on Tuesday, March 6<sup>th</sup>. This allows you enough time to collect and analyze the data. I will not accept project proposals after March 6<sup>th</sup>.
- Your final report is due by noon, on Tuesday, May 1<sup>st</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 the class, either on Tuesday, May 1<sup>st</sup>, or on Thursday May 3<sup>rd</sup>.

## 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 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.

## 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.

- **Phones and wireless devices are turned off.** Please be sure to turn off your phones and wireless devices before class begins.

## **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.

## **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.17	Introduction: WRDS and SAS Introduction, Review of the normal distribution, QQ plot <i>Example: Returns of S&amp;P 500</i>
Jan. 19	WRDS and SAS Introduction continued <i>Example: Holdings of Mutual Funds</i>
Jan. 24	WRDS and SAS Introduction continued <i>Example: Holdings of Mutual Funds, continued</i>
Jan. 26	Linear Regression Model <i>Example: AMZN vs. S&amp;P</i> <i>Example: Mortgage rate vs. LTV</i>
Jan. 31	Hypothesis Testing in a Regression Model <i>Example: Mortgage rate vs. LTV</i>
Feb. 2	Hypothesis Testing in a Regression Model <i>Example: Performance of Mutual Fund Managers</i>
Feb. 7	Prediction of expected and actual values in regression <i>Example: Predicting returns for AMZN</i>
Feb. 9	Dummy Variables and Multiple Regression <i>Example: Mortgage rate vs. LTV, cont.</i>
Feb. 14	Measuring the quality of regression <i>Example: Mortgage rates vs. FICO scores</i>
Feb. 16	Violations of regression assumptions <i>Example: Electricity Usage vs. Temperature</i>
Feb. 21	1 <sup>st</sup> Midterm review
Feb. 23	Solutions of 1 <sup>st</sup> midterm exam
Feb. 28	Model Selection – Backward Regression <i>Example: changes in the AAA Rate vs. various other interest rates</i>
Mar. 1	Qualitative Dependent Variables: Logistic Regression <i>Example: Determining LTV ratios in commercial mortgages</i>
Mar. 6	Qualitative Dependent Variables: Multinomial Logistic Regression <i>Example: Predicting the reason stated for CEO departure</i>
Mar. 8	Time Series Analysis Introduction: moving averages, exponential smoothing <i>Example: Detergent sales</i>

Mar. 20	Time Series Analysis continued: seasonality – Winters method <i>Example: Detergent sales</i>
Mar. 22	Time Series Analysis continued: regression models <i>Example: Detergent sales</i>
Mar. 27	Time Series Analysis review <i>Example: Turkey sales</i>
Mar. 29	Solutions of 2 <sup>nd</sup> midterm exam
Apr. 3	Simulation and Modeling I <i>Example: Drilling for Oil</i> <i>Example: Investing for Retirement</i>
Apr. 5	Simulation and Modeling II <i>Example: Choosing Capacity</i> <i>Example: Valuing Customer Satisfaction</i>
Apr. 10	Simulation and Modeling III <i>Example: Electricity Generator Valuation</i>
Apr. 12	Simulation and Modeling IV <i>Example: Market Share</i>
Apr. 17	Simulation and Modeling V <i>Example: Valuation of Oil Fields and Oil Rigs</i>
Apr. 19	Simulation and Modeling VI <i>Example: Train Scheduling</i> <i>Example: The price is right</i>
Apr. 24	Simulation review
Apr. 26	Solutions of 3 <sup>rd</sup> midterm exam
May 1	Project presentations
May 3	Project presentations