

# STA 371G: Statistics and Modeling

## Spring 2014

**Instructor:** Mingyuan Zhou

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Office Hours: Tuesday Thursday 3:30-4:30 PM and by appointment

### Teaching Assistants:

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**Course Website:** <http://mingyuanzhou.github.io/STA371G>

**Course Description:** This course introduces statistical methods and data analysis tools to model uncertainty in business decisions. After a brief review of basic probability and statistics, we will discuss regression models, time series analysis and decision making. Simulation with statistical software will be incorporated into these topics and used throughout the semester. The introduced statistical models will be illustrated with a large number of real examples, such as those in finance, marketing, economics, politics and sports. Analyzing real datasets with R and Excel will be demonstrated in class. The techniques taught in the course will also be useful in performing data analysis in other BBA courses.

By the end of the course, you will be equipped with the necessary statistical knowledge and skills to solve real-world business problems. Specifically, you will learn how to choose an appropriate statistical model to analyze business data, perform computation with statistical software, validate the output of the model, and draw appropriate conclusions.

### Materials:

- Text:

(a) Course packet available at University Coop. It contains the cases to be studied in this course.

(b) Data Analysis and Decision Making with Microsoft Excel by Albright, Winston and Zappe, 3rd/4th edition. This book covers most of the topics of this course. It is recommended but not required.

(c) OpenIntro Statistics by Diez, Barr and Çetinkaya-Rundel, 2nd Edition, available at <http://www.openintro.org/stat/textbook.php>. This book provides a review of basic probability and statistics. It is recommended but not required.

- Software:
  - (a) R and RStudio. Learning basic operations with R is recommended, though not required. I will use R for class demonstrations and post the R code on the course website. Running these R code by yourself will help you better understand randomness and uncertainty. You are free to use any other software, such as Excel, Matlab, Python, SAS and Minitab.
  - (b) Excel, Analysis ToolPak for Windows, StatPlus:mac LE for Mac.

### **Grading:**

Homework (15%)  
 Midterm Exam 1 (20%)  
 Midterm Exam 2 (20%)  
 Final Exam (45%)

**Homework:** You will receive homework assignments throughout the semester. Although you can discuss the homework problems with each other, everyone is required to hand in a set of solutions that are prepared alone. You will receive the full score for each question that you have provided reasonable answers, even if your answers differ from my solutions.

### **Exams:**

- The first midterm exam will in class on Tuesday, February 25.
- The second midterm exam will be in class on Tuesday, April 8.
- The final exam will be given during the University's final exam period. The specific date is determined by the University.
- If you miss one or two midterm exams for any reason, the weights of the missed exams will be added to the final exam.
- Clerical errors will be corrected without hassle. Other regrading requests must be submitted in writing within one week (7 days) of the exam's return.
- You may bring one 8.5×11 inch page of notes and formulas to the exam.
- You may bring a calculator to the midterm and final exams.
- There is no predetermined grade distribution for this class.

### **Tentative Course Schedule:**

This schedule represents my current plans and objectives. As we go through the semester, those plans may need to change to enhance the class learning opportunity. Such changes, communicated clearly, are not unusual and should be expected.

#### **Week 1**

Jan 14, Random variables and probability distributions  
 Jan 16, Normal and binomial distributions

**Week 2**

Jan 23, Introduction to Monte Carlo simulation  
Jan 21, Estimation and sampling distributions

**Week 3**

Jan 28, Simple linear regression: least squares estimation  
Jan 30, Simple linear regression: covariance and correlation, goodness of fit

**Week 4**

Feb 04, Simple linear regression: model assumptions  
Feb 06, Sampling distributions for regression parameters

**Week 5**

Feb 11, Confidence intervals for regression parameters  
Feb 13, Hypothesis testing for regression models

**Week 6**

Feb 18, Simulation with R and Excel, Case Study  
[Feb 20, Review for Midterm Exam 1](#)

**Week 7**

[Feb 25, Midterm Exam 1](#)  
Feb 27, Multiple regression

**Week 8**

Mar 04, Multiple regression  
Mar 06, Dummy variables and interactions

**Week 9**

Mar 11, Diagnostics and transformations  
Mar 13, Diagnostics and transformations

**Week 10**

Mar 25, Time series  
Mar 27, Time series

**Week 11**

Apr 01, Simulation, Case Study  
[Apr 03, Review for Midterm Exam 2](#)

**Week 12**

[Apr 08, Midterm Exam 2](#)  
Apr 10, Decision making

**Week 13**

Apr 15, Decision making  
Apr 17, Decision making

**Week 14**

Apr 22, Bayes rule and naive Bayes classifier  
Apr 24, Simulation, Case Study

**Week 15**

Apr 29, Simulation, Case Study  
May 01, Review for Final Exam

**Office Hours:** Don't hesitate to come to my office at CBA 6.462 during office hours (Tuesday Thursday 3:30-4:30 PM) or by appointment to discuss a homework problem or any aspect of the course.

**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.

**University of Texas Honor Code:** The core values of The University of Texas at Austin are learning, discovery, freedom, leadership, individual opportunity, and responsibility. Each member of the university is expected to uphold these values through integrity, honesty, trust, fairness, and respect toward peers and community.

**Academic Integrity:** Each student in this course is expected to abide by the University of Texas Honor Code. Any work submitted by a student in this course for academic credit will be the student's own work.

You are encouraged to study together and to discuss information and concepts covered in lecture and the sections with other students. You can give "consulting" help to or receive "consulting" help from such students. However, this permissible cooperation should never involve one student having possession of a copy of all or part of work done by someone else, in the form of an e-mail, an e-mail attachment file, a diskette, or a hard copy.

Should copying occur, both the student who copied work from another student and the student who gave material to be copied will both automatically receive a zero for the assignment. Penalty for violation of this Code can also be extended to include failure of the course and University disciplinary action.

During examinations, you must do your own work. Talking or discussion is not permitted during the examinations, nor may you compare papers, copy from others, or collaborate in any way. Any collaborative behavior during the examinations will result in failure of the exam, and may lead to failure of the course and University disciplinary action.

**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.

**Emergency Evacuation Policy:** Occupants of buildings on the UT Austin campus are required to evacuate and assemble outside when a fire alarm is activated or an announcement is made. Please be aware of the following policies regarding evacuation:

- Familiarize yourself with all exit doors of the classroom and the building. Remember that the nearest exit door may not be the one you used when you entered the building.
- If you require assistance to evacuate, inform me in writing during the first week of class.
- In the event of an evacuation, follow my instructions or those of class instructors.

Do not re-enter a building unless you're given instructions by the Austin Fire Department, the UT Austin Police Department, or the Fire Prevention Services office.