

# STA 371G: Statistics and Modeling

## Spring 2015

Session 1, MW 12:30 - 2:00 PM, Room: UTC 1.146  
Session 2, MW 2:00 - 3:30 PM, Room: UTC 1.146  
Session 3, MW 3:30 - 5:00 PM, Room: UTC 1.146

**Instructor:** Mingyuan Zhou, Ph.D., Assistant Professor of Statistics

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Office Hours: Monday Wednesday 5:00-6:30 PM

You are welcome to come by my office at other times, but to make sure that I will be there then, you may first call my office or send me an email.

### Teaching Assistants:

Fang-Chang Kuo, [amarco.kuo@gmail.com](mailto:amarco.kuo@gmail.com)

Office Hours: TBD

Xiangkun Dai, [xkdai@utexas.edu](mailto:xkdai@utexas.edu)

Office Hours: TBD

**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. One course packet for each group would usually be sufficient.
  - (b) Data Analysis and Decision Making with Microsoft Excel by Albright, Winston and Zappe, 3rd/4th edition. It covers most of the topics of this course. A UT customized version is available at a lower price. It is recommended but not required.

(c) OpenIntro Statistics by Diez, Barr and Çetinkaya-Rundel, 2nd Edition, available for free 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%)

In Class Quizzes (5%)

Midterm Exam 1 (22.5%)

Midterm Exam 2 (22.5%)

Final Exam (35%)

**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.

**Case Study:** You will receive business cases to study throughout the semester. You are encouraged to form groups. Each group may consist of no more than three members. Each group only need to turn in one report.

### Exams:

- The first midterm exam will be on Monday, March 2.
- The second midterm exam will be on Monday, April 13.
- Both midterm exams will be held in the evening to reduce exam stress.
- The final exam is cumulative and covers basic probability and statistics, linear regression, time series, decision making, and simulation. It will be given during the University's final exam period. The specific date is determined by the University.
- Your lowest midterm exam score will be replaced by the other midterm exam score or the final exam score, whichever is higher.
- 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 a midterm exam, and two pages to the final 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.

A more detailed course outline in the course website will be updated on a regular basis.

### **Week 1**

Jan 19, Martin Luther King, Jr. Day, no class

Jan 21, Introduction, random variables and probability distributions

### **Week 2**

Jan 26, Random variables and probability distributions

Jan 28, Normal and binomial distributions

### **Week 3**

Feb 02, Estimation and sampling distributions

Feb 04, Simple linear regression: least squares estimation

### **Week 4**

Feb 09, Simple linear regression: covariance and correlation, goodness of fit

Feb 11, Simple linear regression: model assumptions

### **Week 5**

Feb 16, Sampling distributions for regression parameters

Feb 18, Confidence intervals for regression parameters

### **Week 6**

Feb 23, Hypothesis testing for regression models

[Feb 25, Review for Midterm Exam 1, Discuss Practice Exam 1](#)

### **Week 7**

[March 02, Midterm Exam 1 \(will be held in the evening\)](#)

March 04, Multiple regression

### **Week 8**

Mar 09, Multiple regression

Mar 11, Dummy variables and interactions

### **Week 9**

Mar 23, Diagnostics and transformations

Mar 25, Diagnostics and transformations

### **Week 10**

Mar 30, Time series

Apr 01, Time series

### **Week 11**

Apr 06, Model selection

[Apr 08, Review for Midterm Exam 2, Discuss Practice Exam 2](#)

### **Week 12**

[Apr 13, Midterm Exam 2 \(will be held in the evening\)](#)

Apr 15, Decision making

**Week 13**

Apr 20, Decision making

Apr 22, Decision making

**Week 14**

Apr 27, Decision making

Apr 29, Introduction to Monte Carlo simulation

**Week 15**

May 04, Simulation, Case Study

[May 06, Review for Final Exam, Discuss Practice Exam Final](#)

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**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. You should therefore expect a substantial portion of your grade to come from your use of quantitative skills to analyze real-world problems.

**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.