STA 371G: Statistics and Modeling

Fall 2019

Session 1, 04510, Monday & Wednesday 12:30 - 2:00 PM, Room: UTC 4.134
Session 2, 04520, Monday & Wednesday 2:00 - 3:30 PM, Room: UTC 4.134

Instructor: Mingyuan Zhou, Ph.D., Associate Professor of Statistics
Office: CBA 6.458 (east side of the building that faces the entrance of Gregory Gym)
Phone: 512-232-6763
Email: `mingyuan.zhou@mccombs.utexas.edu`
Website: http://mingyuanzhou.github.io/
Office Hours: Monday & Wednesday 3:30-4:30 PM

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

Teaching Assistants:

Quan Zhang, `quan.zhang@mccombs.utexas.edu`, IROM PhD Student
Office Hours: Tuesday 1:00-2:30 PM, CBA 4.304A-C

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 decision making, regression models, and time series analysis. 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) Data Analysis and Decision Making with Microsoft Excel by Albright, Winston and Zappe, 3rd/4th edition, or Business Analytics: Data Analysis and Decision making by Albright and Winston, 6th 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.

  (b) OpenIntro Statistics by Diez, Barr and Çetinkaya-Rundel, 3rd 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.

(c) Data Science: A Gentle Introduction by James G. Scott, available for free at https://jgscott.github.io/STA371H_Spring2018/files/DataScience.pdf

(d) 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.

- Software:

  (a) R and RStudio (free software). Learning basic operations with R is highly 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, and practice your data analysis skills. You are free to use any other software, such as Matlab, Python, and SAS.

  (b) Excel, Palisade Decision Tools (including StatTools) for Windows, StatPlus:mac LE for Mac.

Grading:

Homework (15%)
In Class Quizzes (7%)
Midterm Exam (36%)
Final Exam (42%)

Makeup Exam/Homework/Quiz: Any students missing exams/homework assignments/quizzes are required to register their situation with UT's Student Emergency Services (SES). The approval from SES is required for requesting makeup exams/assignments/quizzes. For the midterm exam, a proof of a class conflict or other reasonable academic conflict is required for requesting a makeup exam. Your lowest quiz score will be dropped.

Homework: You will receive a total of around eight homework assignments throughout the semester. While you may join a group of no more than three members to complete homework assignments, each member of the group needs to turn in his/her own report and write done the names of all group members. For each homework, a selected subset of questions will be graded based on correctness, while the remaining ones will be graded based on completeness.

For class discussions and homework assignments, we will study the following eight business cases:

1. Amore Frozen Food, UVA-QA-0317
2. Waite First Securities, UVA-QA-0453
3. Milk and Money, KEL343
4. Orion Bus Industries: Contract bidding strategy, IVEY 9B03E005
5. Oakland A's A, UVA-QA-0282

6. Oakland A's B, UVA-QA-0283
7. Northern Napa Valley Winery, Inc, IVEY 9A98E046
8. Freemark Abbey, Harvard 9-181-027

Exams:

- The midterm Exam will be on Monday, October 21 (Location TBD, 6:45-9:45 pm). The midterm exam is held in the evening to reduce exam stress.
- The final exam will cover all materials except for "Decision Making Under Uncertainty." It will be given during the University's final exam period. The specific date is determined by the University. If the final exam score is higher than your midterm score, your midterm score will be modified with

  Modified Midterm Score = (Current Midterm Score + Final Exam Score) /2
- Clerical errors will be corrected without hassle. All regrading requests must be submitted in writing within one week (7 days) of the exam's return.
- You may bring three single-sided pages of notes (8.5×11 inch, letter size) to the midterm exam, and six single-sided pages to the final.
- You may bring a calculator to both the midterm and final exams.
- There is no predetermined grade distribution for this class. The recommended average GPA for this course is between 3.0 and 3.2.
- I reserve the right to curve the grades of both the midterm and final exams.

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

Aug 28, Introduction, random variables and probability distributions

Week 2

Sept 2, Labor Day holiday (No Classes)
Sept 4, Random variables and probability distributions

Week 3

Sept 9, Decision making (probability, payoff tables, non-probabilistic decision criteria)
Sept 11, Decision making (probabilistic decision criteria, utility, Bayes' theorem)

Week 4

Sept 16, Decision making (decision trees)
Sept 18, Decision making (value of information)

Week 5

Sept 23, Normal distributions
Sept 25, Normal distributions, estimation and sampling distributions

Week 6

Sept 30, Estimation and sampling distributions
Oct 2, Introduction to Simulation

Week 7

Oct 7, Simple linear regression: least squares estimation
Oct 9, Simple linear regression: covariance and correlation

Week 8

Oct 14, Simple linear regression: interpretation of model ouput
Oct 16, Model assumptions for linear regression

Week 9

Oct 21, Midterm Exam, 6:45 - 9:45 pm, Location TBD
Oct 23, Sampling distributions for regression parameters

Week 10

Oct 28, Multiple regression
Oct 30, Multiple regression

Week 11

Nov 4, Multiple regression
Nov 6, Multiple regression

Week 12

Nov 11, Dummy variables and interactions
Nov 13, Diagnostics and transformations

Week 13

Nov 18, Diagnostics and transformations
Nov 20, Time Series Analysis

Week 14

Nov 25, Time Series Analysis
Nov 27, Thanksgiving Holidays

Week 15

Dec 2, Model Selection
Dec 4, Simulation, Case Study

Week 16

Dec 9, Practice questions for the final exam

Office Hours: Don't hesitate to come to my office at CBA 6.458 during office hours (Monday & Wednesday 5:00-6:00 PM) to discuss homework problems or any other aspects of the course. Please feel free to come by my office at other times, but to make sure that I

will be there then, you may first call my office, send me an email, or talk to me before or after class to make an appointment.

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.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, provided by 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.

Notification from McCombs Regarding BBA Recruiting Conflicts:

Conflicts occasionally arise between classes and the search for employment. We understand how important the job search process is to you, and McCombs provides many resources in support of career exploration and search. However, UT is first and foremost an educational institution and your BBA degree will be the credential that certifies your education. As such, education will take precedent whenever such a conflict arises.

All companies that recruit at McCombs are informed of this fact. Should a conflict arise, we recommend the following steps:

- Check the syllabus to see if an exception is provided that would allow you to satisfy class obligations while still attending the job event (e.g., paper instead of quiz, allowed quiz drops, etc).
- Note that a job-related conflict, whether a current job or a potential one, is usually not an acceptable reason for missing an exam or taking a make-up, and may not be acceptable in other circumstances either. If any doubt exists, check with your professor.
- If no exception is provided, inform the company that an academic conflict exists and request an accommodation.
- If no accommodation is provided by the company, and you have done everything within your power to resolve the situation, contact BBA Career Services and request their assistance in resolving the situation.

Note that while we do have influence with the companies that recruit at McCombs, not all conflicts can be resolved and we have little or no influence with companies that do not recruit through the Recruit McCombs system.

Finally, be aware that it is not unreasonable for an employer to expect you to go to some lengths to show your interest in them. In a recent example, several students completed an exam at 9 pm and were expected to attend an on-site interview in Houston the next morning at 8 am. A 5:30 am flight from Austin was available and the students were expected to be on it. This is reasonable, and such sacrifices are sometimes expected in a good job and career in business.