70-207 (Fall 2018)

Probability and Statistics for Business Applications

Location and Times:

Fall 2018

Sunday & Tuesday 3:00 - 4:20 PM

CMB 1185

Instructor Information:

Taeyong Park, Ph.D.

✉taeyongp@andrew.cmu.edu

Office: CMB 2191

Office Hours: Sunday & Tuesday 9:30 - 11:00 AM

TA: Tehseen Niaz (✉tniaz@andrew.cmu.edu)

CA: Albandari Almana (✉albandari@cmu.edu)

TA / CA Office Hours: TBD

1. Course Description

This course is designed to teach the statistical methods and computational skills by which you can use data to answer theoretical and practical questions. Throughout the semester, you are expected to develop skills in probability and statistics, learn the tools needed for rigorous statistical analysis, and build a foundation for further studies or applications. More specifically, you will begin with learning probability theory and sampling distributions. These lead into the study of confidence intervals and hypothesis testing. Thereafter, you will learn linear regression analysis, the least squares estimator, and its statistical properties. In addition, you will learn statistical environment R (http://www.r-project.org/). R is widely used in business, economics, biostatistics, social science, and many other fields. It is a powerful programming language for statistical analysis and data visualization. You will use R to manage and analyze data.

2. Prerequisites

- No prerequisite courses. This course is assumed to be your first statistics course.
- No prior knowledge of R is required.

3. Textbooks

- **Required**: David R. Anderson et al. 2017. *Essentials of Statistics for Business and Economics*. 8th Edition. CENGAGE Learning.

- **Optional**: Chris Chapman and Elea McDonnell Feit. 2015. *R for Marketing Research and Analytics*. New York: Springer.

4. Requirements and Evaluation

Reading: No grade on reading. But I recommend you to do the assigned reading as described in the course outline below.

Attendance (5%): Every class, your attendance will be recorded. If you miss one class, you will lose 0.5 % of your final grade, if you miss two classes, you will lose 1 %, and if you miss ten or more classes, you will lose all the attendance credit which is 5 % of your final grade. You are expected to attend class on time and remain in class. If you arrive more than 10 minutes late to class, you will not receive credit. If you leave in the middle of class, you will not receive credit.

Quiz (15%): This is a pop quiz type of in-class assignment. You will be asked to solve a quiz during regular class time without prior announcement. To be always prepared for an unscheduled quiz, you should keep up with the course material on a regular basis and you should stay focused in class. After you turn in your assignment, the entire class will discuss the results if time permits. This is an individual assignment. No discussion with others is allowed. If you miss a quiz as you are absent from class, you will have a chance to take a make-up quiz **only if** your absence is due to a medical issue with a valid excuse provided by CMUQ Health and Wellness Office or due to critical family emergency. Every quiz will be considered for your final grade. That is, none of the quizzes will be dropped. This quiz component as a whole is worth 15% of the final grade for the class, and each one's credit will be determined based on the number of quizzes you will have done in the end of this semester.

Homework Assignment – Problem Sets (15%): You are required to solve 3 problem sets throughout this semester as a homework assignment. Each problem set is worth 5% of the final grade. You should expect that these problem sets will include more challenging questions than the in-class quizzes. Solution sets will be posted on Canvas right after the homework deadline, and hence **no personal extensions will be allowed**. The deadline is before the beginning of class on the date indicated in the course outline below. You are responsible to check that your work is correct using the solution sets posted. You may work with your classmate(s), but **you must write up the solutions on your own**. You must list everyone you worked with on the assignment.

Exam 1 (20%): Exam 1 is an in-class exam. This exam covers the material discussed until the exam day. Further details will be announced when the exam approaches.

Exam 2 (20%): Exam 2 is an in-class exam. This exam covers the material discussed between Exam 1 and Exam 2. Further details will be announced when the exam approaches.

Final Exam (25%): Final is an in-class exam during the final exam week. This exam covers the material discussed after Exam 2. Further details will be announced when the end of the semester approaches.

Letter Grade Distribution:

$$
\begin{array}{ll}
>= 90.00 & \text{A} \\
80.00 - 89.99 & \text{B} \\
70.00 - 79.99 & \text{C} \\
60.00 - 69.99 & \text{D} \\
<= 59.99 & \text{F}
\end{array}
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5. Assigned Seats

You will be asked to sit in your assigned seat from the second week of the semester. This course is one of the largest ones at CMUQ, and we use a large computer lecture hall. You could get distracted easily. This is particularly true when you sit in the back seat and/or your close friend sits right next to you. Assigned seating helps create an environment that is most conducive to learning. Moreover, it makes TA's attendance recording easy and accurate.

6. Electronic Devices and Punctuality

I expect you to be respectful to me and your fellow students.

- You will often use your laptop or desktop during class this semester. However, this does not mean that you can feel free to use the computer for whatever you want. It is important to **use it only for class purposes** so that you will not distract yourself and you will not disrupt your classmates. Furthermore, **your cell phone must be turned off** during class. If there is

an emergency that might oblige you to be contacted, please talk to me before class. I quote the following passage from the Qatar Business Administration Program Classroom Conduct, which, I believe, must apply to other programs as well:

- *Laptops are to be closed. When class is in session, you may use your laptop only as directed by your professor. You should not check email, tweet, text, play games, or surf the Internet, any activity that diminishes your or your classmates' engagement with the classroom content and process. If you are unsure whether a given activity is appropriate, ask your professor. This policy extends to all electronic devices. Be sure that your phones and tablets are silenced and stowed before the class begins. Professors may add specific limits on the sharing or use of personal electronics in exam situations.*

- **You must come to class on time and remain in class** once the class has begun. I quote the following passage from the Qatar Business Administration Program Classroom Conduct, which, I believe, must apply to other programs as well:

  - *In common business culture, punctuality is an important part of showing respect for your colleagues and business partners. Showing up late for a meeting tells the others involved that you do not place much value on their time. QBA students will demonstrate respect for their courses, classmates and professors by arriving for class early enough to get settled and prepared before the scheduled meeting time.*

7. Grade Appeal Policies

For grade appeals regarding quizzes and exams, you should first contact CA Albandari Almana with a clear justification of why you think your grade should be reconsidered. CA will respond to you with her decision. If you do not agree with her decision regarding your appeal, you can contact me. Note that you must make a grade appeal for any assignment within two weeks after that assignment is given.

8. Office Hours and Appointments

In general, I encourage you to come to my office whenever you have questions or concerns regarding this course. That said, in order to arrange our meetings efficiently, I have some policies.

The best time to meet with me is my office hours: Sunday & Tuesday 9:30 - 11:00 AM (subject to change; I will inform you of any change in advance). During my office hours, I always keep my door open. In addition to my office hours, you are welcome to meet with me if my door is open and I'm not meeting with someone. If my door is closed, it means that I am not available (out of the office, working on research or teaching prep, etc). I encourage you to set up an appointment to make sure I will be available if you want to see me other than during my office hours.

9. Academic Integrity

You are expected to comply with the academic integrity policy. You are required to refer to CMU's general policies on cheating and plagiarism: `http://www.cmu.edu/academic-integrity/valuing/index.html`. Violations of CMU's general policies on cheating and plagiarism carry a range of consequences: `http://www.cmu.edu/academic-integrity/understanding/index.html`.

10. Disability Resources and Health and Well-being

You can find information about disability-related accommodations on `https://scotty.qatar.cmu.edu/health-and-wellness/medical-accommodations/`. You may also consult me or CMUQ staff (Office of Health and Wellness) regarding learning disabilities, health, and wellness.

11. Course Outline

Date	Topic	Reading
Sep 2, 4	Introduction	ASWCC Chapter 1.1-1.5
	Lab: Introduction to R	
Sep 9, 11	Descriptive Statistics	ASWCC Chapter 2.1-2.2, 3.1-3.2
	Lab: Basics of R, Data visualization	
Sep 16, 18	Probability Distributions	ASWCC Chapter 5.1-5.4, 6.1-6.3
	Lab: Basics of R, Data visualization	
Sep 23, 25	Sampling Distributions	ASWCC Chapter 7.1-7.2, 7.4-7.5
	Lab: Normal, Binomial Distributions	

Date	Topic	Reading
Sep 30, Oct 2	Lab: Sampling Distributions, Simulation	
	Confidence Intervals	ASWCC Chapter 7.3, 8.1-8.4
	Problem Set 1 Assigned on Oct 2	
Oct 7, 9	Confidence Intervals	ASWCC Chapter 7.3, 8.1-8.4
	Lab: Confidence Intervals	
	Problem Set 1 Due on Oct 9	
Oct 14	**Exam 1**	
Oct 16	Hypothesis Testing	ASWCC Chapter 9
Oct 21, 23	Hypothesis Testing	ASWCC Chapter 9
	Lab: Hypothesis Testing	
Oct 28, 30	Fall Break	
Nov 4, 6	Comparing Two Means	ASWCC Chapter 10.1
	Lab: Comparing Two Means	
	Problem Set 2 Assigned on Oct 6	
Nov 11, 13	Comparing Two Proportions	ASWCC Chapter 10.2
	Lab: Comparing Two Proportions	
	Problem Set 2 Due on Nov 13	
Nov 18	**Exam 2**	
Nov 20	Comparing Three or More Groups (ANOVA, χ^2 tests)	ASWCC 12.1, 13.1-13.2
Nov 25, 27	Comparing Three or More Groups (ANOVA, χ^2 tests)	ASWCC 12.1, 13.1-13.2
	Lab: Comparing Three or More Groups	
Dec 2, 4	Bivariate Regression	ASWCC Chapter 14.1-14.5
	Lab: Bivariate Regression	
	Problem Set 3 Assigned on Dec 4	
Dec 9	Introduction to Multivariate Regression	ASWCC Chapter 15.1-15.5
Dec 11	Final Exam Review	
	Problem Set 3 Due on Dec 11	