

36-200 (Fall 2025)

Reasoning with Data

Location and Times:

Fall 2025

Section W

Sunday & Tuesday 8:30-9:45 AM

Section X

Sunday & Tuesday 10:00-11:15 AM

Instructor Information:

Taeyong Park, Ph.D.

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Office: CMB 2191

Zoom Office: <https://cmu.zoom.us/my/tpark>

Office Hours: Monday 2:00 - 3:00 PM & Tuesday 11:30 AM - 12:30 PM

TA: Wijdan Tariq (✉twijdan@andrew.cmu.edu)

CA: Xyrell Lagade (✉xml@andrew.cmu.edu)

CA: Mahnoor Sethi (✉mahnoors@andrew.cmu.edu)

1. Course Description

This course is an introduction to learning how to make statistical decisions and how to reason with data. The approach will emphasize the thinking-through of empirical problems from beginning to end and using statistical tools to look for evidence for/against explicit arguments/hypotheses. Applications will largely be drawn from interdisciplinary case studies spanning information systems, business, social sciences, and related fields. Methodological topics will include exploratory data analysis, elementary probability, significance tests, and empirical research methods. The course learning objectives are as follows:

- Learn the empirical research process including data collection and design methods.
- Develop and use methods for summarizing and evaluating numerical and discrete data.
- Learn and apply the basic concepts of probability and hypothesis tests.
- Develop skills in the applications of statistical methods to problems in business, economics, and information systems, including interpretation and communication of results.

2. Prerequisites

- No prerequisite courses.

3. Textbooks

- **Required:** David R. Anderson et al. 2017. *Essentials of Statistics for Business and Economics*. 8th Edition. CENGAGE Learning. **Available digitally through a platform called RedShelf in Canvas.**

4. Requirements and Evaluation

Attendance, Quiz, and Participation (4%): You are required to attend every class on time and remain until the end. However, I understand that students may occasionally need to miss class for reasons such as illness or emergencies. Your **first three absences will not affect your final grade**. Beginning with the 4th absence, each additional absence will result in a deduction of 0.5% from your final grade. **Please note: I do not distinguish between excused and unexcused absences, and you do not need to provide medical documentation.** Attendance will be taken by the TA and CA. If you arrive more than 15 minutes late, you will be counted as absent. If you leave class for more than 10 minutes and do not return, you will also be counted as absent. To ensure accurate tracking of attendance and participation, we will use designated seating. For any questions about your attendance record, please contact the CA, TA, or me.

In addition, up to 2% bonus points will be awarded for **exceptionally** active class participation based on the two criteria below.

- On randomly selected days, you will be given a short in-class quiz consisting of 2–3 simple questions and submit your answers during class. You must submit all quizzes throughout the semester.
- Active participation includes, but is not limited to, asking relevant questions, answering my questions, volunteering to share thoughts, etc. Active participation throughout the semester is determined at my discretion.

Exercise and Recitation (10%): Exercise questions are assigned for each module throughout the semester as a homework assignment. The submission deadlines are in the course outline below, and you should submit your assignment to TA Wijdan Tariq.

- The exercise is designed to motivate you to keep up with the material on a regular basis. Furthermore, it provides you with practice questions for the exams.
- Your grade for each exercise will be 1 for complete; 0.5 for submitted but incomplete; 0 for no submission. If you show sufficient effort on your submitted exercise, it will be considered complete, regardless of correct/incorrect answers. Sufficient effort requires evidence that you have worked on at least 80% of the entire questions.

- The answer key will be posted on Canvas after the submission deadline, and hence no extension is permitted. You are responsible to check that your work is correct using the answer key.

Exam 1 (17%): In-class exam. (Modules 1 - 3)

Exam 2 (17%): In-class exam. (Modules 4 - 5)

Exam 3 (17%): In-class exam. (Modules 6 - 8)

Final Exam (35%): In-class exam during the final exam week. This is a **project-type exam** that covers all the material discussed throughout the semester.

- You will get to choose a real dataset (I will provide a selection) to analyze, using inference (hypothesis testing) to investigate research questions/scenarios. The goal is to come up with three research hypotheses involving some of the variables, and then use the significance tests covered in the course to formally support or refute each research hypothesis.
- The three research hypotheses/conjectures don't need to involve the same variables but it may make it easier for you if they do, and it will make your report more coherent overall. Don't try to use as many different variables as possible; instead, try to think about some questions involving some subset of the available variables that when combined together will help you explore some topic of interest and tell a story.
- Detailed information will be provided in class.

Letter Grade Distribution:

≥ 90.00	A (Exceptional)
80.00 - 89.99	B (Good)
70.00 - 79.99	C (Satisfactory)
60.00 - 69.99	D (less than satisfactory, but passing)
≤ 59.99	R (Failing to pass)

5. Electronic Devices and Punctuality

I expect you to be respectful to me and your fellow students to create an environment that is most conducive to learning.

- 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.

6. Office Hours and Appointments

You can meet me during my office hours: Monday 2:00 - 3:00 PM & Tuesday 11:30 AM - 12:30 PM or by appointment. 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.

7. Academic Integrity

You must comply with the academic integrity policy. You are required to refer to CMU's general policies on cheating and plagiarism: <https://www.cmu.edu/student-affairs/ocsi/students/>. Violations of this course's integrity policy include, but are not limited to, cheating through unauthorized

collaboration and receiving unauthorized assistance during examination and/or project preparation. Integrity violations will result in course level sanctions and will be reported to the CMU-Q Community Standards Coordinator and the Associate Dean for Student Affairs.

You may use generative AI programs like ChatGPT during the brainstorming and idea generation phase for assignments. However, doing so cannot be considered a substitute for traditional research. Generative AI programs rely on predictive models to generate content that may appear correct, but has been shown to sometimes be incomplete, inaccurate, taken without attribution from other sources, and / or biased. Any information generated by an AI program should be cited like any other reference material. You are ultimately responsible for the content of the information you submit. However, you may not attempt to pass off any work generated by an AI program as your own.

8. 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.

9. Diversity, Equity, and Inclusion

It is critical for me to ensure that students from all diverse backgrounds and perspectives feel belonging to this course, that students' learning needs be addressed both in and out of class, and that the diversity that students bring to this class be viewed as a resource, strength and benefit. Your suggestions are encouraged and appreciated. Please let me know ways to improve the effectiveness of the course for you personally or for other students or student groups. In addition, if anything conflicts with your value based on gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture, please let me know so that I can make arrangements for you.

10. Course Outline¹

Date	Topic	Reading
INTRODUCTION		Syllabus
Aug 24	Course Introduction	
MODULE 1: Exploratory Data Analysis I		Chapter 1.1-1.5, 2.1-2.2, 3.1-3.2
Aug 26, 31	Lecture & Lab	
Aug 28	Recitation: RMarkdown and GoodBelly Dataset	
Homework	Exercise 1 Due by Sep 3 5:00 PM	
Sep 4	Recitation: Exercise 1	
MODULE 2: Exploratory Data Analysis II		Chapter 1.1-1.5, 2.1-2.2, 3.1-3.2
Sep 2, 7, 9	Lecture & Lab	
Homework	Exercise 2-1 Due by Sep 10 5:00 PM	
Sep 11	Recitation: Exercise 2-1	
Sep 14	Short break; No Class	
Homework	Exercise 2-2 Due by Sep 17 5:00 PM	
Sep 18	Recitation: Exercise 2-2	
MODULE 3: Probability Distributions		Chapter 5.1-5.3, 5.5, 6.2-6.3
Sep 16, 21, 23	Lecture & Lab	
Homework	Exercise 3 Due by Sep 24 5:00 PM	
Sep 25	Recitation: Exercise 3	
Sep 28	Exam 1	
Oct 2	Recitation: Exam 1 Review	
MODULE 4: Sampling Distributions		Chapter 7.1-7.2, 7.4-7.6
Sep 30, Oct 5	Lecture & Lab	
Homework	Exercise 4 Due by Oct 8 5:00 PM	
Oct 9	Recitation: Exercise 4	

¹Subject to change.

MODULE 5: Confidence Intervals		Chapter 7.3, 8.1-8.4
Oct 7	Lecture, Lab, & Exercise	
Oct 12, 14	Fall Break; No Classes	
MODULE 5: Confidence Intervals (continued)		Chapter 7.3, 8.1-8.4
Oct 19, 21	Lecture, Lab, & Exercise	
Homework	Exercise 5 Due by Oct 22 5:00 PM	
Oct 23	Recitation: Exercise 5	
Oct 26	Exam 2	
Oct 30	Recitation: Exam 2 Review	
MODULE 6: Hypothesis Testing		Chapter 9
Oct 28, Nov 2, 4	Lecture & Lab	
Homework	Exercise 6 Due by Nov 5 5:00 PM	
Nov 6	Recitation: Exercise 6	
MODULE 7: Inference for Two Means/Proportions		Chapter 10.1-2, 10.4
Nov 9, 11	Lecture & Lab	
Nov 13	Community Day (No Recitation)	
Homework	Exercise 7 Due by Nov 19 5:00 PM	
MODULE 8: Inference for Three or More Means/Proportions		Chapter 12.1, 13.1-13.2
Nov 16, 18	Lecture & Lab	
Homework	Exercise 8 Due by Nov 19 5:00 PM	
Nov 20	Recitation: Exercise 7 and Exercise 8	
Nov 23	Exam 3	
Nov 27	Recitation: Exam 3 Review	
MODULE 9: Inference for Bivariate Linear Regression		Chapter 14.1-14.6
Nov 25, 30, Dec 2	Lecture & Lab	
Homework	Exercise 9 Due by Dec 3 5:00 PM	
Dec 4	Recitation: Exercise 9	