# 41000: Business Statistics
## Syllabus, Winter 2026

## Contact Information

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## Course Format

*In-person Only*

## Business Statistics or Applied Regression?

Please take the pre-MBA exam to figure out which class would be a better fit. You can access the exam and related materials from the Canvas site below: https://canvas.uchicago.edu/courses/36612

## Course Website

- https://tyliang.github.io/BUS41000/
  (for Lecture Notes, Homework Download, Reproducible Code)

- Canvas https://canvas.uchicago.edu/courses/54122
  (for Discussion, Homework Submission, Announcement)

## Textbooks and Notes

There is *no required textbook* for the class. All *lecture notes and course materials will be available* on the class website. Three books may help you as a complement to the class:

- OpenIntro Statistics (free online resource).
- Naked Statistics, by Charles Wheelan

## Statistical Software

R (and the integrated development environment, RStudio, https://rmarkdown.rstudio.com) will be used to demonstrate statistical analysis of data. However, you are **not required to program in R** for this course. For the homework, you are free to use R/Python/Excel/Stata, or any tool you are familiar with. The main focus of the course (and hence the test) is on intuition and statistical concepts, not on programming skills.

## Evalulation

Grades will be determined by a Final Exam in Week 10 (65%) and Homework (35%). The exams will be take-home. You may choose to skip the Homework; in that case, your final will count as 100%.

Students are expected to complete all exams for the course. **No request for rescheduling of an exam will be accepted on (or after) the date of the exam.** Only extreme personal problems are a reason for rescheduling an exam.

## Request for Regrade

Clerical errors will be corrected without hassle. Other regrade requests must be submitted in writing within one week (7 days) of the exam's return. Keep in mind that the entire exam will be subject to regrading.

## Review Sessions

There will be one interactive R session in week 4, and two review sessions before the final in week 9.

## Office Hours

There will be no official office hours, but I am glad to meet with any student enrolled in the class. The best way to contact me is via email.

## Class Handouts

You are responsible for bringing the relevant section of the lecture notes to every lecture. All course materials are available online.

## Canvas Discussion

Questions about the homework can be posted to the Canvas Discussion section. TAs will answer them within 24-48 hrs during weekdays. I strongly recommend everyone to do all the homework. If you use Large Language Models (LLMs), please clearly state how you used them in front of the submission. Bonus credit will be given to students who post high-quality answers to questions.

## Feedbacks

The University of Chicago believes that a culture of rigorous inquiry demands an environment where diverse perspectives, experiences, individuals, and ideas inform intellectual exchange and engagement. I concur with that commitment and expect to maintain a productive learning environment based upon open communication, mutual respect, and non-discrimination. Any suggestions as to how to further such a positive and open environment in this class will be appreciated and given serious consideration.

## List of Topics

**Section 1**

1. Probability Distributions: Joint, Conditional, Marginal
2. Bayes Formula
3. Simpson's Paradox and Berkson's Paradox
4. Expectation, Variance, Covariance, Correlation
5. Probability -> Decisions
6. Monte Carlo Simulations

**Section 2**

1. Normal Distribution

2. Construct Portfolios (Covariance, Correlation), Sharpe Ratio

3. Central Limit Theorem, and Normal Approximation

4. Bootstrap

5. Estimation Based on Samples

6. Sampling Distribution of Estimates

7. Confidence Intervals

8. Hypothesis Testing, in particular A/B Testing.

**Section 3**

1. Simple Linear Regression (SLR) Model

2. Property of Least Squares

3. Information in Regression Table

4. Statistical Inference and Interpretation of Coefficients

5. Application of SLR: CAPM

**Section 4**

1. Multiple Linear Regression (MLR) Model

2. Interpretation, Visualization, and Estimation

3. Inference about MLR: Uncertainty, T-test, and F-test

4. Demystifying $R^2$

5. Understand MLR vs. SLR (Correlation and Causation)

6. Compare MLRs (Model Selection)

**Section 5**

1. Categorical Variables (Dummy)

2. Case Study: Salary Discrimination (Compare Different MLRs)

3. Multiple Categories

4. Variable Interaction (Simplest Non-linear Model)

5. An Integrated Example using Boston Housing Data (Interactions and Dummies)