ECON 2250 GT1 Summer 2026

PROBABILITY AND STATISTICS FOR ECONOMICS

This syllabus is tentative and is subject to change.

Instructor: TBD

Email: dpalubeski3@gatech.edu

Class Time:

Office Hours: TBD

TA: TBD

Email: TBD

TA Office Hours: TBD

**TA would be the first point of contact with questions on lecture content, assignments, and quizzes, etc.*

COURSE DESCRIPTION

This course serves as an introduction to probability and statistics for economics. It comprises of two main parts: basic probability and statistics, aimed at building a conceptual understanding of probability/statistics theory; and a second part that introduces estimators, hypothesis testing and simple regression.

Students will develop skills to visualize data, present data summary statistics, implement and comprehend estimator and hypothesis testing, and run basic regression. This course requires the use of statistical software R.

This course is designed to offer a rigorous quantitative approach while emphasizing economic data and applications. Successful completion of this course will provide students with the necessary background for more advanced courses, such as Econometric Analysis (ECON 3161).

PREREQUISITES

Students are **strongly encouraged** to complete Calculus courses, such as MATH 1551 (Differential Calculus) and MATH 1552 (Integral Calculus), before enrolling.

TEXTBOOK

- Schervish, Mark J., and Morris H. DeGroot. Probability and Statistics, 4th Edition.
    - https://www.pearson.com/en-us/subject-catalog/p/probability-and-statistics-classic-version/P200000006163/9780137981694?tab=title-overview

REFERENCES FOR PROGRAMMING IN R

- Tutorials on installing and basic programming in R:
    - MIT OCW: https://ocw.mit.edu/courses/18-05-introduction-to-probability-and-statistics-spring-2022/pages/r-and-rstudio/
    - Princeton Research Computing: https://researchcomputing.princeton.edu/education/external-online-resources/R
- Tutorials and worksheets for data visualization and statistics in R: https://ocw.mit.edu/courses/18-05-introduction-to-probability-and-statistics-spring-2022/pages/studio-resources/

Course Grade

Homework	20%	
Exam 1	20%	
Exam 2	20%	(This is not final exam and does not follow final exam rules)
R Project	20%	
Participation	20%	

NO GRADE CHANGES ONE WEEK AFTER THE TEST/ASSIGNMENT IS RETURNED.

Grading Scale

Your final grade will be assigned as a letter grade according to the following scale:

A 90-100%

B 80-89%

C 70-79%

D 60-69%

F 0-59%

I reserve the right to increase all final grades equally if the material is more difficult than expected, but this is unlikely. Also, the final grades may be curved if it is necessary.

Class Participation

This is an in-person course, and students are expected to attend all classes during scheduled times. Each student is allowed **up to three absences** without an excuse. Additional absences may affect your participation grade. Lectures will not be recorded, so attendance is crucial.

Attendance will be checked during **every class session**.

Homework

Homework will be posted on Canvas with specified deadlines. While students may collaborate on assignments, each student must submit their own work **on Canvas**.

The submission must be in **a single file**, either in Word or PDF format.

Homework submitted after the deadline will incur a **50% grade deduction**.

Submissions will **not be accepted** more than **two days** after the deadline.

Exams

There will be two comprehensive, closed-book exams, both conducted **in person** during class time.

Exam 1 will cover Chapters 1-5.

Exam 2 will cover Chapters 8-11.

You may bring a **one-sided A4 cheat sheet** with notes. A **calculator** is also allowed.

No make-up exam will be given except with the approval by the institute's policy. Students must discuss the make-up exam with the instructor at least one week prior to the scheduled exam.

R Project

Students are required to work **individually** on a research project using **R software** as the primary tool. The project must apply the statistical models covered in this course.

You will conduct data analysis on cross-sectional datasets. You may choose to work with either the datasets provided in the course or use your own dataset.

The Format is **12-point Times New Roman font and double-spaced**.

Students are required to complete a proposal, deliver a presentation, and submit a final report.

The proposal: should be **1-3 pages**, including following content:

- Research question (What do you want to explore?)
- Motivation (Why did you choose this topic?)
- Introduction of data and variables (What data are you using, and what are your hypotheses?)

The presentation: should use PowerPoint to show the main content of final report

- The PowerPoint presentation should **not exceed 10 pages**.
- The presentation can last up to **7 minutes.**

The final report should include at least the following content:

- Research Question: Define the dependent and independent variables.
- Motivation: Explain why you chose this topic and its importance.

- Data & Variables: Detail the data sources, key variables, and other relevant information.
- Descriptive Analysis: Provide a summary of the variables (including observations, mean, standard deviation, minimum, and maximum), along with relevant graphs.
- Hypothesis and Test: Present the null and alternative hypotheses, along with your conclusions.
- Regression Result: Present the regression model results, including key coefficients, standard errors, t-statistics, and p-values, along with your conclusions.
- Discussion: Discuss your findings and any limitations.
- **R Code: Include the R code used for your analysis at the end of report.**

Task	**Deadline**	**Points**
Proposal	TBD	5
Presentation	TBD	5
Final report(write-up)	TBD	10

Note: The deadline may be changed if needed.

TENTATIVE TOPICS

1. Basic probability and statistics (Chapters 1 – 5)
    - Definition of the probability (1.5)
    - Definition of Conditional Probability (2.1)
    - Independent Events (2.2)
    - Bayes' theorem (2.3)
    - Random variables, discrete, and continuous distributions (3.1 and 3.2)
    - CDF, bivariate distributions, marginal and conditional distributions (3.3, 3.4, 3.5, 3.6)
    - Expectation of a random variable and properties of expectation (4.1 and 4.2)
    - Variance, moments, the mean, and median (4.3, 4.4 and 4.5)
    - Covariance and correlation, conditional expectation (4.6 and 4.7)
    - Some Common parametric distributions: Bernoulli, Binomial, Poisson and Normal (5.2, 5.4, 5.6)
2. Estimators and hypothesis testing (Chapters 8 -- 9)
    - The sampling distribution of a statistic (8.1)
    - Chi-square distribution (8.2)
    - Joint distribution of the sample mean and sample variance (8.3)
    - The t distribution (8.4)
    - Confidence intervals (8.5)
    - Unbiased estimators (8.7)
    - Problems of testing hypotheses (9.1)
    - Testing simple hypotheses, two-sided alternatives (9.2 and 9.4)
    - The t-test and the F-distribution (9.5 and 9.7)
3. Introduction to Regression (Chapter 11)
    - Least squares and simple linear regression (11.1, 11,2 and 11.3)
4. ChatGPT, R, and Project
    - Introduction to ChatGPT
    - Introduction to R

Academic Integrity

Georgia Tech aims to cultivate a community based on trust, academic integrity, and honor. Students are expected to act according to the highest ethical standards. For information on Georgia Tech's Academic Honor Code, please visit http://www.catalog.gatech.edu/policies/honor-code/

or http://www.catalog.gatech.edu/rules/18/.

Any student suspected of cheating or plagiarizing on a quiz, exam, or assignment will be reported to the Office of Student Integrity, who will investigate the incident and identify the appropriate penalty for violations.

Email Policy

Students are encouraged to contact me over email. To expect a timely response, please send the email to my Georgia Tech email and not through Canvas. Make sure you write "ECON 2250" in the subject line followed by your full name. I am generally quicker on emails and try to respond within 24 hours. If you do not hear back from me, please check if the subject line is as per the above guidelines and send me a follow-up email.

**TA would be the first point of contact with questions on lecture content, assignments, and quizzes, etc.*

Accommodations for Students with Disabilities

If you are a student with learning needs that require special accommodation, contact the Office of Disability Services at (404)894-2563 or http://disabilityservices.gatech.edu/, as soon as possible, to make an appointment to discuss your special needs and to obtain an accommodations letter. Please also e-mail me as soon as possible in order to set up a time to discuss your learning needs.

Student-Faculty Expectations Agreement

At Georgia Tech we believe that it is important to strive for an atmosphere of mutual respect, acknowledgement, and responsibility between faculty members and the student body. See http://www.catalog.gatech.edu/rules/22/ for an articulation of some basic expectations that you can have of me and that I have of you. In the end, simple respect for knowledge, hard work, and cordial interactions will help build the environment we seek. Therefore, I encourage you to remain committed to the ideals of Georgia Tech while in this class.