

Carleton University
Department of Economics
ECON 5055
Financial Econometrics

Instructor: Xu Zhang

Fall 2026

Office: B840 Loeb Building

E-mail: xuzhang@cunet.carleton.ca

Class hours: Tuesdays, 18:05 – 20:55 (September 9 – December 11)

Classroom: Southam Hall, SA505

Brightspace Course Page: <https://brightspace.carleton.ca/d2l/home/449417>

Teaching Assistant: None

Office hours: TBC

Course Description:

The econometrics of empirical finance including parametric and nonparametric models of volatility, evaluation of asset-pricing theories, and models for risk management and transactions data.

Learning Outcomes:

This course introduces econometric methods commonly used in empirical finance. By the end of the course, students should understand the main econometric concepts covered in class and be able to apply them to financial data. Topics include time-series models for financial returns, the CAPM and factor models, volatility models such as ARCH/GARCH, realized and stochastic volatility, and Value-at-Risk. Students will also gain experience implementing some of these methods using Python or another programming language.

Preclusions and Prerequisites:

Preclusions: None.

To understand the material of this financial econometrics course, students are expected to have taken or be taking concurrently ECON 5027 or an equivalent course in econometrics/statistics. Students who believe they have taken a similar background course or courses from another university must provide appropriate documentation to the Department of Economics Graduate Administrator.

Texts & Course Materials:

There is no required textbook for this course. Students are not required to purchase textbooks or other learning materials for this course. A set of lecture notes will be provided. These notes along with the in-class lectures will constitute the main source of information for students. During the course, there may be some updates to the lecture notes. Below is a list of references students might find useful.

O. Linton, *Financial Econometrics: Models and Methods*, Cambridge University Press, 2019.

D. G. Luenberger, *Investment Science*, 2nd ed., Oxford University Press, 2013.

T. A. Severini, *Introduction to Statistical Methods for Financial Models*, CRC Press, 2018.

W. Enders, *Applied Econometric Time Series*, 2nd ed., Wiley, 2004.

J. Y. Campbell, A. W. Lo, and A. C. MacKinlay, *The Econometrics of Financial Markets*, Princeton University Press, 1997.

D. Ruppert, *Statistics and Finance: An Introduction*, Springer, 2004.

J. J. Siegel, *Stocks for the Long Run: The Definitive Guide to Financial Market Returns & Long-Term Investment Strategies*, 5th ed., McGraw Hill Professional, 2014.

B. G. Malkiel, *A Random Walk Down Wall Street: The Time-Tested Strategy for Successful Investing*, 12th ed., W. W. Norton & Company, 2020.

Course Assessment:

Evaluation element	Weight	Timing / details
Final exam	40%	Scheduled by the university during the exam period; in person; closed-book; will cover all material in the course.
Midterm	25%	November 3; in class; handwritten on answer sheets; closed-book; no make-up midterm. If you miss the midterm for a valid reason, the weight will be transferred to the final exam.
Assignments	20%	Two assignments, 10% each; due October 20 and December 1.
In-class presentation	15%	In-class group presentation.
Total	100%	

Assessment Notes:

The course grade is based on one in-person final exam worth 40%, two assignments worth 10% each, one in-class midterm worth 25%, and an in-class group presentation worth 15%. (Please ignore the weights automatically assigned by Brightspace.) The midterm will be held in class on November 3, will be handwritten on answer sheets, and will be closed-book. There will be no make-up midterm. If you miss the midterm for a valid reason, the weight will be transferred to the final exam. The final exam will be scheduled by the university during the exam period, will cover all material in the course, and will be closed-book. There will be no early final exam; students must apply to the Registrar's Office to request a deferred final exam. If you miss an exam without a verifiable reason, a grade of zero will be assigned for the missed exam.

Course Calendar:

Key Date	Course Activity / Assessment
October 6, 2026	Assignment 1 Released
October 20, 2026	Assignment 1 Due
October 26–30, 2026	Fall Break — No Classes
November 3, 2026	In-Class Midterm Examination
November 17, 2026	Assignment 2 Released
December 1, 2026	Assignment 2 Due
December 8, 2026	In-Class Student Presentations

Assignment and Submission Notes:

Assignment 1 will be posted on October 6 and is due on October 20. Assignment 2 will be posted on November 17 and is due on December 1. Assignments must be submitted within 15 minutes of the beginning of class on the due date. No late or deferred assignments will be accepted. If you fail to submit an assignment on time without a verifiable reason, a grade of zero will be assigned to the missed assignment.

For your assignments, you may need to use Python or another programming language of your choice. If you decide to use Python, then you can access Jupyter Notebook at <https://colab.research.google.com> (you need to have a Gmail account to use Colab). You may also want to run Python locally on your computer by installing Anaconda and an IDE such as Microsoft Visual Studio Code. When installing Python packages, follow the installation instructions for your setup; for Anaconda, `conda install -c conda-forge <package>` is often a good option to avoid potential conflicts.

There are many excellent resources to learn Python. For example, <https://www.youtube.com/c/Coreyms/videos>. To learn more about Python, please see, e.g., W. McKinney (2022). *Python for Data Analysis: Data Wrangling with pandas, NumPy, and Jupyter*.

Topics:

The following outlines the tentative list of significant topics to be covered throughout the semester. The extent and coverage of each topic will depend on time availability.

1. Background
 - a. The purpose of financial markets
 - b. Types of financial markets and trading
 - c. Financial returns and their descriptive statistics
 - d. Utility functions and risk aversion
 - e. Portfolio choice
Linton, Ch. 1
Severini, Ch. 2
2. Time-Series Models of Stock Returns
 - a. Autoregression
 - b. Random walk
 - c. Return predictability
 - d. Predicting stock returns
Linton, Ch. 2
Ruppert, Ch. 4
Severini, Ch. 3
3. Capital Asset Pricing Model (CAPM)
 - a. Introducing CAPM
 - b. Testing CAPM
Linton, Ch. 7
Severini, Ch. 7
4. Factor Models
 - a. Diversification
 - b. Arbitrage pricing theory
 - c. Testing factor models
Linton, Ch. 8
Severini, Chs. 9 and 10
Luenberger, Ch. 8
5. Volatility Modelling
 - a. ARCH and GARCH models
 - b. Realized volatility
 - c. Stochastic volatility
Linton, Ch. 11
Ruppert, Ch. 12
6. Risk Management with Value-at-Risk (VaR)
 - a. VaR for an individual asset
 - b. VaR for a portfolio of assets
Linton, Ch. 14
Ruppert, Ch. 11
Christoffersen, Chs. 1 and 2

Notes: Student or professor materials created for this course (including presentations and posted notes, labs, case studies, computer codes, assignments, and exams) remain the intellectual property of the author(s). They are intended for personal use and may not be reproduced or redistributed without prior written consent of the author(s).

Collaboration and Group Work:

Assignments must be completed independently unless the instructor explicitly states otherwise. The in-class presentation is a group presentation. Students may collaborate fully with members of their assigned presentation group, and all group members are expected to contribute meaningfully to the preparation and delivery of the presentation.

Generative Artificial Intelligence (AI):

AI use in this course: Students may use AI tools for basic word processing functions, including grammar and spell checking (e.g., Grammarly, Microsoft Word Editor, Copilot). Students may also use AI tools for ideas, clarifying challenging concepts or getting started on projects. Some acceptable uses include:

- Sounding board (e.g., generating assignment or presentation topics with ChatGPT, using Microsoft Word Smart Lookup or Copilot to find inspiration and related topics).
- Creating outlines (e.g., using AI to structure an assignment or presentation flow, using Microsoft Word Outline View with AI suggestions).
- Providing definitions or explanations of complex concepts (e.g., using AI to explain a difficult theory or to find relevant information).

Documenting use of AI: It is not necessary to document the use of AI for basic word processing functions listed above. It is necessary to document moderate use of AI in this course, using the following guidelines:

- Clearly identify and cite AI-generated text (e.g., "The following paragraph was generated by ChatGPT/Microsoft Word Researcher tool/Copilot").
- Review, edit, and ensure accuracy and originality of final submissions.
- AI-generated content should not exceed 30 percent of the total assignment or presentation length.

Why have I adopted this policy? This policy allows basic support to enhance clarity, correctness, layout, and flow of ideas. It also supports the use of AI as a supplementary tool, helping students develop ideas and structure their work while emphasizing the importance of transparency and personal engagement with the content. AI can be used for inspiration and foundational support and can encourage students to critically assess and refine AI-generated material.

Limitations: AI tools cannot be used to complete the midterm or the final exam. For assignments and the group presentation, AI may support thinking, organization, and explanation, but it may not replace the student's own analysis, calculations, interpretation, or presentation work.

As our understanding of the uses of AI and its relationship to student work and academic integrity continue to evolve, students are required to discuss their use of AI in any circumstance not described here with the course instructor to ensure it supports the learning goals for the course.

Plagiarism:

Please be aware that plagiarism is a serious offence at Carleton and should be recognized and avoided. You are responsible for reading and knowing the information about plagiarism, Carleton University resources, and academic accommodations found in <https://carleton.ca/economics/plagiarism-resources-and-accommodations/>.

The University Academic Integrity Policy defines plagiarism as “*presenting, whether intentionally or not, the ideas, expression of ideas or work of others as one’s own.*” This includes reproducing or paraphrasing portions of someone else’s published or unpublished material, regardless of the source, and presenting these as one’s own without proper citation or reference to the original source. Examples of sources from which the ideas, expressions of ideas or works of others may be drawn from include but are not limited to books, articles, papers, literary compositions and phrases, performance compositions, chemical compounds, artworks, laboratory reports, research results, calculations and the results of calculations, diagrams, constructions, computer reports, computer code/software, material on the internet and/or conversations.

Examples of plagiarism include, but are not limited to:

- any submission prepared in whole or in part, by someone else, including the unauthorized use of generative AI tools (e.g., ChatGPT)
- using ideas or direct, verbatim quotations, paraphrased material, algorithms, formulae, scientific or mathematical concepts, or ideas without appropriate acknowledgment in any academic assignment
- using another’s data or research findings without appropriate

acknowledgement

- submitting a computer program developed in whole or in part by someone else, with or without modifications, as one's own
- failing to acknowledge sources with proper citations when using another's work and/or failing to use quotation marks.

Requests for Academic Accommodations:

Carleton is committed to providing academic accessibility for all individuals. You may need special arrangements to meet your academic obligations during the term. The accommodation request processes, including information about the Academic Consideration Policy for Students in Medical and Other Extenuating Circumstances, are outlined on the Academic Accommodations website (students.carleton.ca/course-outline).

For Religious Obligations	To be worked out on individual basis with instructor. Consult Equity Services Website or an Equity Advisor (ext. 5622) for Policy and list of Holy Days (www.carleton.ca/equity)
For Pregnancy	Contact Equity Services (ext. 5622) to obtain <i>letters of accommodations</i>

Student Mental Health:

As a student you may experience a range of mental health challenges that significantly impact your academic success and overall well-being. If you need help, please speak to someone. There are numerous resources available both on- and off-campus to support you. For more information, please consult <https://wellness.carleton.ca/>

For Students with Disabilities:

Students with disabilities needing academic accommodations are required to contact a coordinator at the Paul Menton Centre to complete the necessary *letters of accommodation*. The student must then make an appointment to discuss their needs with the instructor at least two weeks prior to the mid-term examination. He/she must also check with the PMC for accommodation for formally scheduled final examinations.

Thank you! If you have any further questions/concerns, please feel free to ask me for help.