

# **DATASCI 385: Quantitative Finance**

## **Fall 2026**

### **General Information**

**Class Meeting Times:** Mondays and Wednesdays, 5:30 PM-6:45 PM in White Hall 200

**Instructor:** Ruoxuan Xiong, [ruoxuan.xiong@emory.edu](mailto:ruoxuan.xiong@emory.edu)

**Office Hours:** Tuesdays, 5:00 PM-6:00 PM in Room 581, Psychology and Interdisciplinary Sciences (PAIS) Building

### **Course Description**

We live in an uncertain world. Every day, we need to make decisions about alternatives whose consequences cannot be predicted with certainty. Here are a few examples:

- You have saved 2,000 dollars from your summer internship. Should you put it under your mattress, buy a Certificate of Deposit, Apple stock, or an S&P 500 index fund?
- You manage a mutual fund specializing in technology stocks. Which proportion of the fund's total assets should you invest in each of the stocks recommended by your analysts?
- You work for a venture capital firm that wants to exit an investment. How can you compute the fair value of the firm's share in the venture?

In each of these situations, you need to commit resources (time, money, effort, etc.) in the face of uncertainty about the future. You will learn how to evaluate and compare investments under certainty about future payoffs. You will also learn how to extend these principles to investments under uncertainty and derive the implications for portfolio choice and risk management. The focus is on basic principles and how they are applied in practice. No prior knowledge of finance is required. Basic preparation in mathematics (probability, statistics, and optimization) is required (see prerequisites below). The course is appropriate for students wishing to apply their quantitative skills to develop a basic understanding of financial modeling and markets. The following topics will be covered:

1. Important institutional material focusing on the financial environment
  - a. Major players in the financial market
  - b. The types of securities traded in the financial markets

- c. How and where securities are traded
2. Modern portfolio theory and its implications for the equilibrium structure of expected rates of return on risky assets
  - a. Risk, return, volatility, value at risk, and expected utility
  - b. Investors' risk preferences and how they bear on asset allocation
  - c. Portfolio optimization
  - d. Capital asset pricing model
  - e. Arbitrage pricing theory and linear factor model
3. Security valuation
  - a. Fixed-income securities – bond pricing and term structure relationships
  - b. Equity securities
  - c. Derivative securities
4. Advanced topics
  - a. Financial machine learning
  - b. Financial technology

## Grading

You are responsible for keeping up with all announcements made in class and all schedule changes posted on the class website.

The grade will be based on the following:

- Homework 30%
- Midterm 30%
- Final exam 35%
- Participation 5%

## Homework

There will be 4 homework assignments. The homework assignments consist of both theoretical and empirical questions. The main statistical software used in class is R.

The homework assignments are done in groups. Group size will depend on class enrollment, but the target is three students per group. You should choose the same group for all homework assignments. The homework will be graded on a 100-point scale. You have three free late days for all homework assignments as a group. You can use at most two late days for one homework assignment.

Homework is assigned and due as follows:

- Homework 1 handed out on Sep 4, 2026 , due on Sep 25, 2026
- Homework 2 handed out on Sep 25, 2026 , due on Oct 16, 2026

- Homework 3 handed out on Oct 16, 2026 , due on Nov 13, 2026
- Homework 4 handed out on Nov 13, 2026 , due on Dec 4, 2026

## Exams

Both the midterm and final exam will be take-home. There is no make-up exam.

The midterm exam will be handed out at Oct 30, 2026 00:00 AM and due at Nov 2, 2026 11:59 PM. You can choose any 24-hour window to complete it.

The final exam will be handed out at Dec 11, 2026 00:00 AM and due at Dec 14, 2026 11:59 PM. You can choose any 24-hour window to complete it.

## Participation

You can fulfill your class participation through either of the following two ways:

1. Attend the class, ask and answer questions.
2. Submit questions for lecture material or feedback for this course through the Google Form.

## Prerequisites

DATASCI 220 Regression Analysis or equivalent.

## Textbooks

You will only be tested on the material presented in lectures, and learned through the homework. Here are two useful references for the course material:

- Bodie, Zvi, Kane, Alex, & Marcus, Alan. *Investments*. 2020 (12th edition)
- Luenberger, David G. *Investment science*. OUP Catalogue. 2013 (2nd edition)

## Honor Code

All students enrolled at Emory are expected to abide by the Emory College Honor Code. Any type of academic misconduct is not allowed, which includes 1) receiving or giving information about the content or conduct of an examination, knowing that the release of such information is not allowed and 2) plagiarizing, whether intentionally or

unintentionally, in any assignment. For the activities that are considered to be academically dishonest, refer to the Honor Code:  
<http://catalog.college.emory.edu/academic/policies-regulations/honor-code.html>.

## **Accessibility and Accommodations**

As the instructor of this course, I endeavor to provide an inclusive learning environment. I want every student to succeed. The Department of Accessibility Services (DAS) works with students who have disabilities to provide reasonable accommodations. You are responsible for requesting accommodations. In order to receive consideration for reasonable accommodations, you must register with the DAS at <http://accessibility.emory.edu/students>. Accommodations cannot be retroactively applied, so you need to contact DAS as early as possible, and please contact me as early as possible in the semester to discuss the plan for implementation of your accommodations.

For additional information about accessibility and accommodations, please contact the Department of Accessibility Services at (404) 727-9877 or [accessibility@emory.edu](mailto:accessibility@emory.edu).