
FIN 708: Financial Economics II - Part B

Continuous Time Finance

Syllabus, Fall 2017

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Class Meetings – Starting November 6th

- **Time:** Monday 9:00AM – 12:00PM; **Location:** SBA, Marketing Conference Room.

Textbooks

- **Arbitrage Theory in Continuous Time** by Thomas Björk
- **Dynamic Asset Pricing Theory** by Darrell Duffie
- **Lecture Notes**

Office Hours

By appointment

Course Objectives

This is an introductory mini-course in continuous time finance. The purpose of this class is to equip students with the fundamental tools and techniques essential to understand the underpinnings of continuous time finance.

Covered Topics

The primary focus of this course is continuous time finance. We will first discuss contingent claim valuation in discrete time. Next, we will study the concepts of Wiener processes, stochastic differential equations, stochastic calculus, and Itô's lemma. We will then introduce the concept of risk-free valuation and hedging, and derive the basic Black and Scholes (1973) option pricing formula for European options. We will conclude the course with an introductory discussion on stochastic dynamic programming in continuous time and the Hamilton-Jacobi-Bellman equation. Time permitting, we will review some economic applications of continuous time finance in portfolio choice (Merton (1969)) and the Intertemporal Capital Asset Pricing Model (Merton (1973)).

Honor Code

All students must comply with the University of Miami policies for conduct and academic honesty at all times during this course. Any violations of these policies will result in referral to the appropriate administrative body.

Special Accommodations

If you need an accommodation for a disability, please let me know at your earliest convenience. Some aspects of the course, the assignments, and the in-class activities may be modified to facilitate your participation and progress. As soon as you make me aware of your needs, we can work with the Office of Services for Students with Disabilities to help us determine appropriate accommodations. I will treat information you provide as private and confidential. If you are planning to miss a lecture due to religious reasons you need to notify me within the first three days of classes.

Smartphone, Tablet, and Laptop Use

Smartphones, laptops, and tablets are strongly prohibited during lectures.

General Guidelines

- **Readings:** You are expected to have required readings completed **before** each class. These readings will include relevant sections from the textbooks and lecture notes.
- **Lecture Notes:** Lecture notes will be handed out via email **before** each class.
- **Problem Sets:** There will be at least three individual problem sets. Students are encouraged to work on the problem sets using Matlab.
- **Active Participation:** During the lecture, I like to ask a lot of questions.

Difficult Topics: If you find certain sections of the course difficult, do not panic! I encourage you to discuss these topics with me and/or your colleagues.

Continuous Feedback: I encourage you to give me feedback about course material, teaching style and anything else that would help you understand finance concepts better. You should come and talk to me in person if you have any concerns and/or suggestions.

Examinations and Grading

- **Exams:** There will be **NO** exams
- **Grading Policy:**
 - *Maximum Possible Score: 100 points.*
 - *Individual Problem Sets: 100 points.* There will be at least three problem sets. The first two problem sets make up for 60 points, 30 points each, while the last problem set makes up for 40 points. For these problem sets, you will work **INDIVIDUALLY**. You will get the full points if you turn in **ALL** problem sets in a clean and presentable way, showing considerable effort for **ALL** questions. You need to turn in your problem sets before the pre-specified deadlines. Problem sets submitted **after** the deadline will be subject to a **30% grade penalty**. Problem sets are the best way to rehearse the materials we learn in class.

How to Study for the Class?

- **Focus on the lecture notes, book chapters, and problem sets.**

Tentative Topics

1. Introduction; Discrete-time option pricing
Suggested Readings: Duffie ch. 1 - 2 ; Björk ch. 1 - 3; Lecture Notes 0
2. Stochastic processes in continuous time;
Suggested Readings: Duffie ch. 5; Björk ch. 4 - 5; Lecture Notes 1
3. Stochastic calculus and Itô's lemma;
Suggested Readings: Duffie ch. 5; Björk ch. 4 - 5; Lecture Notes 1
4. The Black-Scholes option pricing formula;
Suggested Readings: Duffie ch. 5; Björk ch. 6-7; Lecture Notes 2
5. Dynamic programming in continuous time;
Suggested Readings: Duffie ch. 9; Björk ch. 19; Lecture Notes 3
6. Optimal portfolio problems in continuous time;
Suggested Readings: Duffie ch. 9; Björk ch. 19; Lecture Notes 3; Merton (1969)
7. Intertemporal Capital Asset Pricing Model;
Suggested Readings: Lecture Notes 3; Merton (1973)

This list of topics is only tentative. I may add or delete topics from this list as the quarter progresses. You are responsible for any changes I announce in the class.