Syllabus

FIN 5018 – Topics in Quantitative Finance (1.5 Units)

Sections 01 / 02 – Fall 2025

Instructor:	Lorenzo Naranjo
Office:	Simon Hall 281
Office Hours:	Tuesday / Thursday (1:00pm – 3:30pm)
Email:	naranjo@wustl.edu
Meeting Times:	Section 01 | Tuesday / Thursday 4:00pm – 5:20pm | Simon Hall 113
	Section 02 | Tuesday 6:15pm to 9:15pm | Simon Hall 103
Class Modality:	In-person

Class Information

Course Description

The main objective of this course is to familiarize students with the current cutting-edge techniques implemented by the quantitative finance industry. The contents of this course can vary from year to year. Topics may include risk management, statistical arbitrage, and derivative pricing and hedging. Some practical projects may be used for implementation of these techniques. This course is only open to MSFQ students in their last semester and Financial Engineering majors who have taken ESE 427.

Classroom Etiquette

Class time is important and I will make sure that every minute we spend in the class is productive. Therefore, any activity that prevents me or other students to use class time in a productive manner is forbidden.

Make sure to arrive on time. If during the term I see that many students are constantly arriving late I will start taking attendance as soon as the class starts. You have mu commitment that the class will start and end on time.

> **!** Important
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> No computers are allowed in class unless authorized by the instructor for a specific activity that requires the use of a computer. You can use a tablet only if you plan to take notes with it and as long as you keep your tablet horizontal at all times. The usage of an external keyboard, a computer mouse or headphones in class is also forbidden.

Learning Goals

1. Knowledge
    - Describe the fundamental pricing equation based on the existence of a stochastic discount factor (SDF).
    - Describe how consumption, production and financial markets interact in equilibrium.
    - Describe how information is incorporated into prices.
2. Comprehension
    - Explain how the law of one-price implies the existence of a SDF.
    - Describe how the assumption of no-arbitrage implies the existence of a strictly positive SDF.
    - Explain how in equilibrium consumption-based asset pricing is equivalent to production-based asset pricing.
    - Explain how adverse-selection affects liquidity and market efficiency in financial markets.
3. Application
    - Compute a SDF from the marginal utility of consumption.
    - Compute the price of bonds and derivatives under the risk-neutral measure.

- Determine measures of price impact and market liquidity.

4. Analysis
    - Question the validity of the assumptions used to generate asset-pricing models.
    - Explain the limits to no-arbitrage.
5. Synthesis
    - Summarize the main ideas behind modern asset pricing models.
6. Evaluation
    - Value the merits of an asset pricing model.

Class Materials

All class materials are available in https://lorenzonaranjo.com/fin5108/. I have linked all the material we will cover in the class to Canvas.

There is no textbook for the class. However, I have used materials from the following textbooks in preparing this class.

- Back, K. (2010). Asset pricing and portfolio choice theory. Oxford University Press.
- Campbell, J. Y. (2017). Financial decisions and markets: A course in asset pricing. Princeton University Press.
- Cochrane, J. H. (2005). Asset pricing: Revised edition. Princeton university press.
- Duffie, D. (2001). Dynamic asset pricing theory. Princeton University Press.
- Huang, C. & Litzenberger, R. H. (1988). Foundations for financial economics. North-Holland.
- Ingersoll, J. E. (1987). Theory of financial decision making (Vol. 3). Rowman & Littlefield.
- Luenberger, D. G. (1997). Optimization by vector space methods. John Wiley & Sons.

Grading

Following is the summary of weights on the various components that I will use to evaluate your performance in this course:

Assignment	Weight
Class Attendance	10
Final Exam	45
Group Presentation	20
Problem Sets	25
Total	100

The grading scale of the class will approximately follow the table below.

Percent	Grade
90-100	A
80-89	B
70-79	C
60-69	D
59-Below	F

The precise grade cutoffs between and within letter grades will be chosen so that the average grade for the class is around 3.5 GPA. For MBA students, as per school rules no more than 20% high passes can be awarded in total. Your final grade will depend on your performance relative to your classmates in all sections.

Grades are non-negotiable. If you feel I have graded one of the course requirements incorrectly, please bring it to my attention immediately. Grade appeals (e.g., because your points were not added up correctly) must be submitted within a week after the grades are released. I certainly want all of you to receive the grades you have earned.

Class Attendance

Class participation, classroom interaction, and collaboration are a signature of the Olin culture and Code of Conduct. Class time is critical to learning, and prompt attendance during our class times is expected.

I will take attendance by either roll calling your name, asking you to sign an attendance sheet or asking you to do a small assignment on Canvas. Students that are more than 20 minutes late will only get half of the attendance points.

> ❗ Class Modality
>
> All students are expected to attend **in person**. All classes will be recorded using Kaltura. If you miss a class please make sure to watch the corresponding recording and ask me questions if you need help. There will be no hybrid option via Zoom.

Final Exam

There will be a final exam that will test your understanding of the main issues that we discussed in class, and will be based on the problem sets and concepts that we covered during class. The exam will be in person and the logistics will be announced later. The exam is an individual assignment and is closed notes and closed book. The exam

The exam time is non-negotiable. If you have a conflict, you must inform me by the end of the first week of the course. Hence, I encourage you to check your schedule early (e.g., make sure that the exam dates do not conflict with a religious holiday, etc.). If you think you will miss the final exam, please (1) immediately e-mail me prior to the exam time and (2) send me a justifiable and reliable proof of absence. Without clear and hard evidence, you will get no credit.

Presentations

There will be group presentations to be held the last week of classes. Each group must have three students from the **same section**. Given current enrollments, Section 1 students will present on 9/25, 9/30 and 10/2 whereas all students in Section 2 will present on 9/30.

Each team is required to make a 15-minute presentation of a paper of their choice in one of the dates indicated in the course schedule. The specific date for students in Section 1 will be chosen at random. The paper that each group presents should abide to the following parameters:

- The paper should closely relate to at least one of the topics we covered in class.
- The paper must be **published** in either a top economic journal (American Economic Review, Econometrica, Journal of Political Economy, Quarterly Journal of Economics, Review of Economic Studies) or a top finance journal (Journal of Finance, Journal of Financial Economics, Review of Financial Studies) in the last 15 years (2010-2025).

After choosing the paper, please send me your choice for my approval. The deadline to submit your choice is 9/19 at 11:59pm CST.

Each student in the team must make part of the presentation in about an equal amount of time. The entire team presentation needs to include the following:

1. Explaining why the paper is relevant to expand our understanding on some of the topics covered in the class.
2. Evaluating the contribution (theory/methodology or empirical or both) and its importance.
3. Explaining the main difference from the existing literature (as of writing of the paper).
4. Explaining the main results, ideas, and implications (economic intuition, simple examples if possible)

During the presentation, you can use **hand written notes** but the use of phones or any other electronic device is forbidden. The dress code for the presentation is business

casual. The grading rubric for the presentation will be provided shortly. Class attendance rules apply for presentations.

You must submit your presentation on Canvas on Monday by 11:59 pm CST if you are presenting on Tuesday and by Wednesday 11:59 pm CST if you are presenting on Thursday.

Problem Sets

There are five problem sets due at 11:59 pm CST on the dates indicated below. All problem sets are individual and must be handwritten. You will then scan your work and submit a PDF file via Canvas.

Assignment	Date
Problem Set #1	9/5
Problem Set #2	9/12
Problem Set #3	9/19
Problem Set #4	9/26
Problem Set #5	10/13

An automatic penalty of 0.2% per hour (4.8% per day) will be applied to late submissions.

Honor Code and Code of Conduct

This course will follow the standards specified in the Code of Conduct and Code of Academic Integrity, which were presented to faculty and students of the Olin Business School. Students are expected to be familiar with the codes.

Course Schedule

The tentative course schedule for different sections is given below. The topics covered on each proposed date may change as the course progresses, but the main content and the general order should not vary.

Section 1

Session	Date	Topic
1	8/26	The Fisher Model
2	8/28	Consumption Based Asset Pricing
3	9/2	The Geometry of the Payoff Space
4	9/4	The Stochastic Discount Factor (SDF)
5	9/9	Review of Continuous-Time Methods
6	9/11	The SDF in Continuous Time
7	9/16	The Heston Stochastic Volatility Model
8	9/18	Bayesian Updating and the Grossman-Stiglitz Model
9	9/23	Learning and Filtering
10	9/25	Group Presentations
11	9/30	Group Presentations
12	10/2	Group Presentations
–	10/7	Fall Break (No Classes)
–	10/9	Fall Break (No Classes)
13	10/18	Final Exam

Section 2

Session	Date	Topic
1	8/26	The Fisher Model
		Consumption Based Asset Pricing
2	9/2	The Geometry of the Payoff Space
		The Stochastic Discount Factor (SDF)
3	9/9	Review of Continuous-Time Methods
		The SDF in Continuous Time
4	9/16	The Heston Stochastic Volatility Model
		Bayesian Updating and the Grossman-Stiglitz Model
5	9/23	Sequential Trading
6	9/30	Group Presentations
–	10/7	Fall Break (No Classes)
7	10/18	Final Exam

Required Policies

Academic Integrity

In all academic work, the ideas and contributions of others (including generative artificial intelligence) must be appropriately acknowledged and work that is presented as original must be, in fact, original. You should familiarize yourself with the appropriate academic integrity policies of your academic program(s).

Unauthorized Recording and Distribution of Classroom Activities and Materials

The following applies to all students in my class: "Except as otherwise expressly authorized by the instructor or the university, students may not record, stream, reproduce, display, publish or further distribute any classroom activities or course materials. This includes lectures, class discussions, advising meetings, office hours, assessments, problems, answers, presentations, slides, screenshots or other materials presented as part of the course. If a student with a disability wishes to request the use of assistive technology as a reasonable accommodation, the student must first contact the Office of Disability Resources to seek approval. If recording is permitted, unauthorized use or distribution of recordings is also prohibited."

Disability Resources

WashU supports the right of all enrolled students to an equitable educational opportunity and strives to create an inclusive learning environment. In the event the physical or online environment results in barriers to your inclusion due to a disability, please contact WashU's Disability Resources (DR) as soon as possible and engage in a process for determining and communicating reasonable accommodations. As soon as possible after receiving an accommodation from DR, send me your WashU Accommodation Letter. Remember that accommodations cannot be applied retroactively. https://disability.wustl.edu/

Sexual Harassment and Assault

If you are a victim of sexual discrimination, harassment or violence, we encourage you to speak with someone as soon as possible. Understand that if you choose to speak to me as an instructor, I must report your disclosure to my department chair, dean, or the Gender Equity and Title IX Compliance Officer, which may trigger an investigation into the incident. You may also reach out to the Relationship & Sexual Violence Prevention (RSVP) Center to discuss your rights and your options with individuals who are not mandatory reporters. https://titleix.wustl.edu/students/confidentiality-resources-support/

Religious Holidays

To ensure that accommodations may be made for students who miss class, assignments, or exams to observe a religious holiday, you must inform me in writing before the end of the third week of class, or as soon as possible if the holiday occurs during the first three weeks of the semester. For more information, please see the university's Religious Holiday Class Absence Policy.

Emergency Preparedness

Before an emergency affects our class, students can take steps to be prepared by downloading the WashU SAFE App. In addition, each classroom contains a "Quick Guide for Emergencies" near the door.

Resources for Students

WashU provides a wealth of support services that address academic, personal, and professional needs. To start exploring resources that can help you along the way, please visit: Resources for Students.