



Math 5021

Mathematical Theory Applied to Finance

MFM

Required Text: *Options, Futures, and Other Derivatives* (Tenth Edition), John C. Hull.

Recommended Texts:

- *Python for finance*, Yves Hilpisch.
- *Financial Calculus. An introduction to derivative pricing*, Martin Baxter and Andrew Rennie.

Grade Distribution:

Midterm	35%
Final	35%
Quizzes	10%
Homework	20%

• **Quizzes**

- Starting on the second week there will be a quiz right after the break (each class, except for weeks 8, 9 and 15). For the final grade your 3 best quizzes will be considered.

• **Homework**

- It will be assigned weekly.

• **Website**

- <http://fm5021.weebly.com/>

• **Contact information**

- Email: carlos.tolmasky at gmail dot com.

• **TA**

- Nicole Hoft.
- Office hours: Thursdays 10 am - 11 am and 8:30 pm - 9:30 pm.
- Email: hoft0007 at umn dot edu.

- **Extra credit**

- No extra credit work will be accepted. Incompletes will be given only in cases where the student has completed all but a small fraction of the course with a grade of C or better and a severe unexpected event prevents completion of the course.

Tentative Course Outline:

The weekly coverage might change as it depends on the progress of the class. We will follow the order as it comes in Hull's book. However, we will deviate in the specifics pretty often.

Week	Content
Week 1	<ul style="list-style-type: none"> • Introduction. • Futures Markets and Central Counterparties
Week 2	<ul style="list-style-type: none"> • Hedging Strategies using futures. • Interest rates.
Week 3	<ul style="list-style-type: none"> • Determination of forward and futures prices.
Week 4	<ul style="list-style-type: none"> • Interest rates futures. • Swaps. • Securitization and the Credit Crisis of 2007. XVAs.
Week 5	<ul style="list-style-type: none"> • Mechanics of options markets. • Properties of stock options.
Week 6	<ul style="list-style-type: none"> • Trading strategies involving options. • Binomial trees.
Week 7	<ul style="list-style-type: none"> • Binomial trees. • Review.
Week 8	<ul style="list-style-type: none"> • Midterm Exam
Week 9	<ul style="list-style-type: none"> • Wiener processes and Itô's lemma.
Week 10	<ul style="list-style-type: none"> • The Black-Scholes-Merton model.
Week 11	<ul style="list-style-type: none"> • Employee stock options. • Options on stock indices and currencies.
Week 12	<ul style="list-style-type: none"> • Options on Futures. • Black's Model.
Week 13	<ul style="list-style-type: none"> • The Greek letters.
Week 14	<ul style="list-style-type: none"> • Volatility smiles.
Week 15	<ul style="list-style-type: none"> • Review.