Instructor: José E. Figueroa-López

- Office: Math 542, Phone: (765) 494 6036
- Office hours: Tuesdays 9:00 - 10:00, Thursdays 3:00 - 4:00, or by Appointment.
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Course description:
This course will introduce the mathematical concepts and tools necessary for the arbitrage-free pricing of equity derivatives such as call and put options and more general contingent claims. We will cover in detail the discrete-time Binomial Model and its continuous-time version, the Black-Scholes Model. The fundamental concepts of hedging, arbitrage, and market completeness will be given a rigorous mathematical formulation. The main mathematical tool is stochastic calculus and its connection to partial differential equations. Practical implementation of the formulas will also be discussed.


Main References:
- Instructor’s class notes posted online in the course’s webpage.

Other recommended reading: Some topics of the course will be complemented with some excerpts from the following books.


Prerequisites and suggested preparation:
- A graduate introduction to probability theory (no measure theory needed) at the level of MA/Stat 519.
- Elementary real analysis at the level of MA 440 required.
- Differential equations at the level of MA 360 is required.
- Basic programming experience in a high-level language such as R, Matlab, C, C++, etc.
Grading and attendance policy:

- ATTENDANCE IS MANDATORY. Justified absence should be notified to the instructor with anticipation.
- One in-class exam (25 %) will test your grasp of the material covered in class.
- A comprehensive final exam (35 %).
- Homework (20 %).
  Note: While it is acceptable to work in groups, each student must turn in a separate assignments, which must reflect YOUR understanding of the material ("almost" identical solutions will not be accepted and tolerated). NO LATE homework will be accepted without a valid justification.
- Quizzes (10 %).
- A final group project (10 %).
  You will be required to turn in one class project/paper and give an in-class presentation based on it. Project topics will be taken from advanced chapters of the textbook or suggested reading, and/or student’s personal reading (with instructor’s accord).

Tentative subjects to be presented:

- Stochastic calculus. [Björk] Chap. 4 & 5. [S] Vol. II. Ch. 4 and Ch. 6.

I hope you will enjoy this course. Have a nice semester.