MATH174E: MATHEMATICAL FINANCE

Summer 2019

GENERAL INFORMATION

Instructor	Hanbaek Lyu	(Email: *hlyu@math.ucla.edu*, Office: MS 6156)
Lectures	MWR 11:00AM - 12:50PM at La Kretz Hall 120	Course webpage
Office hours	(tentative) TF 2:00PM - 3:00PM at MS 6156	
Textbook	John C. Hull, *Options, Futures and Other Derivatives*, 10th Edition. Pearson 2018 (link) Rick Durrett, *Essentials of Stochastic Processes*, 2nd Edition (link)	
Prerequisites	33A, 170A (or Statistics 100A), Economics 11	
TA	ZIEGLER-HUNTS, JULIAN	(Email: *julianzh@ucla.edu* , Office: MS 2963)

COURSE DESCRIPTION

Modeling, mathematics, and computation for financial securities. Price of risk. Random walk models for stocks and interest rates. No-arbitrage theory for pricing derivative securities; Black/Scholes theory. European and American options. Monte Carlo, trees, finite difference methods. P/NP or letter grading.

GRADING

- Final score will be the maximum of the following schemes:
  - **Scheme 1**: Homework (15%) + Midterm 1 (20%) + Midterm 2 (20%) + Final (45%)
  - **Scheme 2**: Homework (15%) + max(Midterm 1, Midterm 2) (30%) + Final (55%)
- All grades will be posted via MyUCLA gradebook.

HOMEWORK

- Homeworks will be assigned weekly on every Wednesdays, and are due at the beginning of the class on following Wednesday.
- No late homeworks will be accepted.
- One lowest homework score will be dropped.
- A random sample of problems will be graded by the TA.
- Solutions on some selected problems will be posted in the course website.
- Discussing homework problems with the instructor, TA, or classmates are encouraged. But you need to write your own solution with your own understanding.

EXAMS

- There are two midterms and one final exam.
  - **Midterm 1**: Monday, Aug. 19 in class.
  - **Midterm 2**: Wednesday, Sep. 4 in class.
  - **Final**: Thursday, Sep. 12 in class.
- There is no make-up exam. You should attend the final exam to pass the course.
- Please bring your UCLA ID card to all exams.

TENTATIVE COURSE SCHEDULE

Below is a tentative course schedule based on the departmental guideline. There could be a slight change depending on our progress.

Week	Date	Section	Topics
1	M 8/5	Hull 1, 3	Introduction (Derivatives, Types of traders, Examples of positions), Heading using futures
	W 8/7	Hull 4-5	Interest rates, Determination of forward and futures prices
	R 8/8	Hull 11	Properties of Stock Options (Put-Call Parity, Upper and Lower Bounds for Prices, Effect of Dividends)
2	M 8/12	Hull 12	Trading strategies
	W 8/14	Durrett 5	Martingales
	R 8/15	Durrett 5, 6.1	Martingales, No arbitrage principle
3	M 8/19		**Midterm 1**
	W 8/21	Hull 13, Durrett 6	Binomial Tree Model of Option Pricing
	R 8/22	Hull 13, Durrett 6	Capital asset pricing model, American options
4	M 8/26	Hull 14	Weiner process
	W 8/28	Hull 14	Itô's Lemma, Black-Scholes model
	R 8/29	Hull 15, Durrett 6	Black-Scholes model
5	M 9/2		Labor day (no class)
	W 9/4		**Midterm 2**
	R 9/5	Hull 19	The Greeks
6	M 9/9	Hull 21	Basic Numerical Procedures
	W 9/11		Review
	R 9/12		**Final**