

MATH174E: MATHEMATICAL FINANCE

Summer 2020

GENERAL INFORMATION

Instructor	Hanbaek Lyu	(Email: hlyu@math.ucla.edu , Office: MS 6156)
Lectures	MWR 11:00AM - 12:50PM using zoom (LINK)	Course webpage
Office hours	W 3:00PM - 5:00PM	
Textbook	John C. Hull, <i>Options, Futures and Other Derivatives</i> , 10th Edition. Pearson 2018 (link) Rick Durrett, <i>Essentials of Stochastic Processes</i> , 2nd Edition (link) Stephen Blyth, <i>An Introduction to Quantitative Finance</i> , (link)	
Prerequisites	33A, 170A (or Statistics 100A), Economics 11	
TA	BAKER, WILLIAM	(Email: williambaker7328@gmail.com)
	LOTT, ADAM	(Email: adamlott99@math.ucla.edu)

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 two schemes:
 - Scheme 1:** Homework (25%) + Midterm (35%) + Final (40%)
 - Scheme 2:** Homework (25%) + Final (75%)
- 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. Submit as a PDF file to CCLE.
- No late homeworks will be accepted.
- One lowest homework scores 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 is one midterm and one final exam. (Both are open book, take-home tests)
 - Midterm:** Wed, 8/19
(Exam will be uploaded to CCLE at 11AM. Submit a PDF scan to CCLE by 11AM the following day)
 - Final:** Fri, 9/11
(Exam will be uploaded to CCLE at 11AM. Submit a PDF scan to CCLE by 11AM the following day)
- There is no make-up exam. You should attend the final exam to pass the course.

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 8/3		Introduction (Derivatives, Types of traders, Examples of positions)
	W 8/5		Mathematical formulation of no-arbitrage principle, interest rates
	R 8/6		Forward value and forward price, Forward rates and LIBOR
2	M 8/10		Interest rate swaps, Future contracts
	W 8/12		Basic properties of options
	R 8/13		Hedging and replication in the two-state world, The fundamental theorem of asset pricing
3	M 8/17		1-step binomial model and examples
	W 8/19		Midterm
	R 8/20		2-step binomial model and examples
4	M 8/24		N -step binomial model and examples
	W 8/26		Conditional expectation and Martingales
	R 8/27		Binomial models revisited, Pricing American options
5	M 8/31		Pricing American options
	W 9/2		Continuous-time limit of binomial models
	R 9/3		The Black-Scholes PDE
6	M 9/7		No class (labor day)
	W 9/9		Review
	F 9/11		Final