IE 420 – Financial Engineering

All times are Champaign times (US Central Time)

Instructor	Liming Feng Email: fenglm@illinois.edu Office hour: TBD
Course sites	https://compass2g.illinois.edu https://www.gradescope.com
Prerequisites	Introductory probability/statistics (e.g., IE 300)
Credit hours	Undergraduate 3 hours; Graduate 4 hours
Teaching assistant	Peter McGlaughlin Email: mcglghl2@illinois.edu Office hour: TBD

Zoom Links (see links on https://compass2g.illinois.edu**)**

- Lectures
- Office hours and appointments with TA/instructor

Course description

Introduction to the theory and practice of financial engineering: basics of derivative securities and risk management; Markowitz portfolio theory and capital asset pricing model; interest rate and bonds; forward and futures contracts, hedging using futures contracts; option contracts and arbitrage relationships; binomial model, no arbitrage pricing, risk neutral pricing, and American options pricing; Brownian motion, Black-Scholes-Merton model, Black-Scholes formula, delta hedging, Greek letters, implied volatility, and volatility smile.

Course materials

- Lecture notes: available on http://compass2g.illinois.edu
- References (* Availability electronically from the library)
  - Marek Capinski, Tomasz Zastawniak, 2003, Mathematics for Finance: an Introduction to Financial Engineering, Springer. *
  - Aron Gottesman, 2016, Derivatives Essentials, Wiley. *
  - John Hull. Options, Futures, and Other Derivatives.
  - David Ruppert, 2004, Statistics and Finance, Springer. *

Policies

- Homework 50%, In-class live-video test I 25% (*Thursday 3/11/2021*), In-class live-video test II 25% (*Tuesday 5/4/2021*)
- **Homework** should be submitted on https://www.gradescope.com. Submit homework early to avoid possible last-minute technical difficulties.
- **Late homework:** Half of the points will be taken off a late homework. No homework submission accepted 24 hours after it's due. The lowest two homework scores are dropped.
- **Make-up tests** are possible only under emergencies (official proof required **prior to** the tests). Make sure you don't have interviews, meetings etc. during the time of the tests.
- **Regrading** requests for correcting possible grading errors must be submitted within one week after the work is returned. **No corrections possible afterwards**
- All homework assignments must be **finished individually.**
- Cheating in this course is not tolerated. Those who violate will be reported. You should never share your work with others. For UIUC student code of conduct, see https://studentcode.illinois.edu/docs/20.001.FullCodeInside.vf.pdf

- Announcements about the course are made in class or by email. It is your responsibility to attend class on time and check email regularly for announcements.

Tentative course content

- Basics **(**derivative securities, hedging, risk management, arbitrage**)**
- Interest rate and bonds (compounding, bond yield, duration and convexity)
- Markowitz portfolio theory (efficient frontier, capital asset pricing model, beta)
- Forward contracts (forward price, no arbitrage pricing, forward contracts valuation)
- Futures (settlement and margining, cross hedging)
- Options (arbitrage relationships, European put-call parity, American options, basic trading strategies)
- Binomial model (no arbitrage pricing, risk neutral pricing, delta hedging, pricing American options)
- Black-Scholes-Merton model (introductory stochastic calculus, Black-Scholes-Merton equation, risk neutral valuation, Black-Scholes formula, Greek letters, implied volatility and smiles)
- Optional topics of interest

Tentative Schedule

Sun	Mon	Tue Lecture (11-12:20)	Wed	Thu Lecture (11-12:20)	Fri	Sat
		L1 1/26		L2 1/28		
		HW01 L3 2/2		L4 2/4		
		HW02 L5 2/9		L6 2/11		
		HW03 L7 2/16		L8 2/18		
		HW04 L9 2/23		L10 2/25		
		HW05 L11 3/2		L12 3/4		
		HW06 L13 3/9 Review/Q&A		3/11 In-Class Test I		
Summer Time Starts		L14 3/16		L15 3/18		
		HW07 L16 3/23		L17 3/25		
		HW08 L18 3/30		L19 4/1		
		HW09 L20 4/6		L21 4/8		
				HW10 L22 4/15		
		L23 4/20		L24 4/22		
	HW11	L25 4/27		L26 4/29 Review/Q&A		
	HW12	5/4 In-Class Test II				