Course: IE 420 – Financial Engineering

Credit and contact hours:
3 credit hours, 3 lecture hours/week

Instructor(s): Liming Feng

Textbook(s) and/or other required material:

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 relationship; binomial model, no-arbitrage pricing, risk-neutral pricing, and American options pricing; Brownian motion, Black-Scholes-Merton model, delta hedging, Greek letters, implied volatility, and volatility smile.

Prerequisite(s): IE 300

Required or elective:
IE technical elective, IE Economics and Finance Track elective

Course outcomes (program outcomes in brackets):
After completing the course, students will be able to:
• use derivative securities to manage risks [f]
• evaluate commonly used derivatives securities [a,k]
• work in a team to achieve a common objective [d]

List of topics:
• Introduction to derivative securities and derivatives trading (1 week)
• Review of introductory probability and statistics (1 week)
• Markowitz mean-variance portfolio theory and CAPM (1.5 weeks)
• Interest rates and bonds (1 week)
• Forward and futures contracts (2.5 weeks)
• Midterm exam (0.5 week)
• Option contracts (1.5 weeks)
• Binomial option pricing model (2 weeks)
• Black-Scholes-Merton option pricing model (2.5 weeks)
• Greek letters and volatility smiles (1 week)