Instructor: Triet Pham, Office: Hill Center Room 207, Email: trietpham@math.rutgers.edu

Office Hours: T 5:00 - 6:30 pm, Th 3:30-5:00 pm and by appointment.

Course Website: http://math.rutgers.edu/~tmp140/courses/Fall2014/M485/F14-M485.html


Reference:
1. Mathematics for Finance by Capinski and Zastawniak.
   (Capinski and Zastawniak is available at Rutgers library in electronic copy)

Course Objectives: In this course we will study the mathematical theory and financial concepts used to model and analyze financial derivatives. Topics that we will go over include binomial tree, continuous time stock and interest rate models, option pricing, Black-Scholes formula and hedging. We will also go over the mathematical concepts of martingales and Brownian motion, which are fundamental in understanding these financial models.

Course Outline:

Please note that this is a tentative outline. As the course progresses, we may adjust the pace and / or the material if necessary. It may be that we do not cover the last few topics. There will also be additional notes posted on the course website.


WEEK 2: Risk neutral measure, pricing and the fundamental theorem of asset pricing for the one period model. Text: Sections 2.2–2.4.

WEEK 3: Multi-period, binomial tree models, I: Pricing European options by backward induction. Text: Sections 3.1, 3.2. See also 4.1, 4.2 for your information.

WEEK 4: Multi-period binomial tree models, II; pricing American options and exotic options. Text: Sections 3.2, 3.3. See also 4.3 for your information.

WEEK 5: Martingales in discrete time. Text: Class notes.

WEEK 6: Hedging and arbitrage. Sections 2.5, 2.6, 3.7. Also revisit 1.2 and 1.3 for your information.
WEEK 7: Continuous time models: Central limit theorem and limit of binomial trees. Brownian motion and geometric Brownian motion. Text: Class notes. Sections 5.1 and 5.2.

WEEK 8: The Black-Scholes model and the Black-Scholes pricing formula. Text: Sections 5.4 and 5.5.


WEEK 11: Review of the continuous time models, Brownian motion, Ito’s formula, Black-Scholes model, Black-Scholes PDE.


WEEK 14: Interest rate models and pricing. Text: Sections 8.4, 8.5.

Grade Breakdown:

Homework: 15 %
Midterm 1: 25 %
Midterm 2: 25 %
Final: 35 %

Calculator policy: Scientific calculators are permitted (and probably needed) in the exams.

Academic Honesty: As a Rutgers University student, you have agreed to abide by the University's academic honesty policy, as stated in http://academicintegrity.rutgers.edu. Lack of knowledge of the academic honesty policy is not a reasonable explanation for a violation. Questions related to course assignments and the academic honesty policy should be directed to the instructor.

Extra help: All students are strongly encouraged to come to my office hours to discuss homework problems or any aspect of the course. I am also available by appointments if the office hours do not fit into your schedule. Sending me emails regarding your questions is also an excellent way to get a prompt response.

University Attendance Policy: Students are expected to attend classes regularly, according to what is stated in http://sasundergrad.rutgers.edu/academics/courses/registration-and-course-policies/attendance-and-cancellation-of-class

Important Dates:
Last Day to Withdraw (without a "W" grade) ........ Sept. 11, 2014
Last Day to Add ........................................... Sept. 12, 2014
First midterm . Oct. 9, 2014 (Subject to change - To be taken 1 week before the early warning grade is issued)
Second midterm ............................................ Nov. 13, 2014
Last Day to Withdraw (with a "W" grade) ............. Oct. 27, 2014
Final Exam .............................. Dec 16, 2014: 8:00 PM - 11:00 PM