1 Aims and Objectives

As made clear by the current financial crisis, a good understanding of derivatives (such as futures, swaps, and options) is indispensable for all practitioners, from investment managers to corporate financiers. The purpose of this course is to provide you with the necessary knowledge on how to use and not to use the models for derivatives. While the course will primarily focus on payoffs, usage, pricing, hedging, and institutional details of the most fundamental or vanilla versions of Options and Futures, it will also deal in some detail with more recent studies in the theory of derivative pricing.

You will acquire a robust conceptual knowledge of the fundamental issues that determine the valuation and behavior of these instruments. Though this course focuses on the intuitive economic insights of those models, some advanced math is required, including stochastic calculus. Be prepared for some necessarily non-trivial math if you take the course.

2 Textbook and Reading Materials

Class notes will form the core material required for the course and are available on the Rutgers Blackboard. The recommended textbook is J. C. Hull, *Options, Futures, and other Derivative Securities*, 7th Edition, Prentice Hall, 2008.\(^1\) We will use it as background, but will not follow it very closely. In addition, some supplementary reading materials will also be posted on the blackboard, to fuel your curiosity in the relevant topics that cannot be fully covered in the sessions.

\(^1\)Earlier editions (5th and 6th editions) are also fine for this course, though you need to pay attention to the changes of chapter numbers.
3 Teaching Assistant

I have a teaching assistant, Truman Hong, a Ph.D. student in the school. Truman may be reached via E-mail (hongtu@scarletmail.rutgers.edu).

4 Grading

Your grade in this course $G$ will be given by:

$$ G = .3 \times H \text{(optional)} + .3 \times M + .4 \times F \,$$

where $H$ is the grade on the home work; $M$ the grade on an in-class Midterm; $F$ the grade on an in-class Final.

4.1 Homework

The homeworks in this course are optional, but I encourage students to attempt them. Students are allowed to do the homework assignments in groups of three. You need permission to form a group greater than three. The objective of this is to enhance the student’s ability to work well with others, and not to encourage free-riding. A group should turn in a single copy of their work with the names of all contributing members. This work should be turned in to Truman Hong’s email before 5pm on the due date. To maintain fairness to all students, late homework assignments will not be accepted.

The homework questions and the due dates will be posted on the blackboard, where the solutions will also be posted after the due dates. The problem sets will be graded by Truman, who will also available to review the solutions of the homework assignments after the assignments are handed in. However, there will not be formally scheduled review sessions on the assignments. The graded problem set will be handed back a week after its solution is due.

4.2 Exams

There are two in-class exams. A midterm exam will take place after we cover the materials on the Binomial Model. It has been tentatively scheduled on March 21st. This exam is meant to help you to organize the concepts you will learn in the class and the questions will be comparable to the homework questions, with less calculations.

A final exam will take place during the final session of the course (May 2nd). The exam will include all material covered during the course. The exam will be more of a test of your
understanding of how to price derivatives rather than a reproduction of course material or some numerically intensive calculation. Absence at the final exam will result in a score of zero for the exam.

You can take a crib sheet (one page, double-sided) to the exams. Calculators are permitted, but no computers or other devices.

5 Course Outline

The following outline represents the topics, readings, assignments, and the sequence of coverage of these topics in class sessions.

- **January 24:** Introduction to the Course.
  
  ◊ Reading materials: Notes, Chapter 1\(^2\).

- **January 31:** Forwards and Futures, Pricing and Hedging.
  
  ◊ Reading materials: Notes, Chapter 2, 3, 5.

- **February 7:** Forwards and Futures: Pricing and Hedging & Case Studies.
  
  ◊ Reading materials: Notes, Chapters 3, 5 and supplemental materials.

- **February 14:** Swaps 1 & 2.
  
  ◊ Reading materials: Notes, Chapter 7, and supplemental materials.

- **February 21:** Introduction to Options & Noarbitrage restrictions on options prices.
  
  ◊ Reading materials: Notes, Chapters 8, 9, 10.

- **February 28:** Introduction to the Binomial Model.
  
  ◊ Reading materials: Notes, Chapter 11.

- **March 7:** Application of Binomial model

\(^2\)All the chapter numbers refer to those in Hull’s book (7th edition). Earlier editions may have different chapter numbers
More on the binomial model: Applications of the Binomial Model to dividend-paying underlying asset, American options, and some exotic options.

— Reading materials: Notes, Chapter 11.

• **March 21:** In-class Midterm Exam

• **November 28:** The Black–Scholes Model.
  
  ◊ Reading materials: Notes, Chapters 12, 13, 15, 16.

• **April 4:** Application of the Black model and Scholes & Risk neutral valuation and simulation.
  
  ◊ Reading materials: Notes, Chapter 14, 17.

• **April 11:** Exotics.
  
  ◊ Reading materials: Notes, Chapter 22 and Papers.

• **April 18:** Recent studies.
  
  ◊ Reading materials: Notes and Papers.

• **April 25:** Review.

• **May 2:** In-Class Final Exam