

North Carolina State University
Department of Economics

ECG 590I – Asset Pricing – Fall 2006
SYLLABUS

Class Time: MW 1:30 - 2:45 PM Nelson Hall 4210

Instructor: Denis Pelletier

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Office Hours: Wednesday 3:15 - 4:45 PM, or by appointment.

Prerequisites:

- Minimal calculus background in multivariable calculus (partial differentiation and multiple integration) – the kind of material covered in NCSU’s math courses MA231 or MA242. Better would be advanced calculus, such as MA425, or any real analysis course beyond that.
- Ordinary differential equations – see MA301.
- Linear algebra – see MA305.
- Probability theory – see MA421.

No economics or finance background is required for this course, but you would find at least one course in basic economics (such as EC201) very useful. Those of you enrolled in the Financial Mathematics program are encouraged to consider taking a course in microeconomic theory (EC301 or ECG700) to acquire an understanding of how markets work. If you are interested in studying the behavior of interest rates, a course in macroeconomic theory (such as EC302 or ECG703) is essential. However, for this course – ECG590I – you can get by without any of that material.

Required Textbook: Hull, John C., *Options, Futures, & Other Derivatives*, 6th edition, Pearson Education, 2006, ISBN 0-13-149908-4.

Electronic material: The following two textbook chapters are available from the electronic reserve of the NCSU library:

- Huang, Chi-Fu and Robert H. Litzenberger, *Foundations for Financial Economics*, Prentice Hall, 1998, Chapter 3: Mathematics of the portfolio frontier, pp. 59-82.
- Neftci, Salih N., *An Introduction to the Mathematics of Financial Derivatives*, second edition, 2000, Academic Press, Chapter 2: A primer on the arbitrage theorem.

Course Description:

This course is an introduction to the pricing of assets. The emphasis is on the mathematical methods used to derive pricing formulas, but there will also be some time devoted to explaining the major types of paper assets (options and other derivatives) that can be priced with those methods. Real assets, such as factories and machines, also can be priced with the same methods. Details of their pricing are covered in other courses (IE711, ECG784).

Many of you will be taking MA546 (probability and stochastic processes) simultaneously with this course. There is a small amount of overlap and a great deal of complementarity between the two courses. MA546 is about the mathematics of things evolving over time as they are subjected to random shocks; this course is about particular objects that do that kind of wandering - asset prices. This goal of this course is to introduce you to the major types of asset prices and to give you an understanding at an intuitive level of the relation between asset prices and the mathematics that governs their evolution. The two courses together give you the necessary background for MA547, which provides a rigorous discussion of the mathematics of asset pricing.

Grading:

Homework Assignments	20%
Midterm Exam (Wednesday, Oct 18)	30%
Final Exam (Monday, Dec 11, from 1:00 to 4:00 PM)	50%

The date for the midterm is somewhat tentative and may change slightly according to the needs of the class or the instructor. The exams and homework assignments will be cumulative in nature.

Exam questions will be taken from material covered in:

- the lecture notes and related classroom discussion,
- the textbook,
- handouts,
- the homework assignments.

The policy regarding homework assignments is that unless otherwise stated, they will be due by 5:00 PM on the date assigned. Late assignments will absolutely not be accepted and a score of zero will be recorded barring special and extraordinary circumstances. The same policy applies to the exams. I do not give exam early and I do not give exam late (barring special and extraordinary circumstances).

Outline of the course:

1. **Introduction to various derivatives:** Hull, chapter 1.
2. **Present value:** (no reading)
3. **Risk aversion:** (no reading)
4. **Arbitrage:** Neftci
5. **Forward and Futures Prices:** Hull, chapters 2 and 5
6. **Hedging using futures:** Hull, chapter 3
7. **Demand, Supply and Equilibrium:** (no reading)
8. **Interest rates:** Hull, chapter 4
9. **Basics of options, including trading strategies:** Hull, chapters 8, 9, 10
10. **Binomial trees:** Hull, chapter 11
11. **Elements of asset pricing** (stochastic differentiation, Weiner and Poisson processes, Ito's lemma): Hull, chapter 12
12. **Introduction to Black-Scholes:** Hull, chapter 13
13. **Implied volatility:** Hull, chapter 16
14. **Greek letters and hedging:** Hull, chapter 15
15. **Capital Asset Pricing Model and portfolio management:** Huang and Litzenberger
16. **Value-at-Risk, and estimating volatilities and correlations:** – Hull, chapters 18 and 19
17. **Credit risk:** Hull, chapters 20 and 21
18. **Real options, and insurance, weather and energy derivatives:** Hull, chapters 23 and 31