Math 485 – Introduction to Mathematical Finance

Course Description from Bulletin: This is an introductory course in mathematical finance. Technical difficulty of the subject is kept at a minimum, while the major ideas and concepts underlying modern mathematical finance and financial engineering are explained and illustrated. The course covers the binomial model for stock prices, and touches on continuous time models and the Black-Scholes formula. (3-0-3)

Enrollment: Elective for AM and other majors.


Other required material:

Prerequisites: MATH 475 or consent of the instructor

Objectives:

1. Students will understand the basics of financial instruments such as stocks, bonds, futures, forwards, options and other derivatives.
2. Students will learn about arbitrage free pricing and hedging.
3. Students will understand the role of risk neutral probability measure and the use of elementary stochastic analysis in mathematical finance.
4. Student will understand the binomial model for stock prices and its use for pricing and hedging European and American type options.
5. Students will learn the basics of continuous time models and the Black-Scholes option pricing formula.
6. Students will learn how to use mathematical software (MATLAB, Mathematica) to price and hedge financial instruments in discrete time models.

Lecture schedule: 3 50 minutes (or 2 75 minutes) lectures per week

Course Outline:

1. Financial Markets: Stocks, Bonds, Futures, Options 6
2. Arbitrage, Hedging and Valuation of Contingent Claims 12
3. Binomial Model for stock price 15
   a. European Options
   b. American Options
   c. Exotic Options
4. Continuous time models. Black-Scholes formula 12

Assessment:

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homework</td>
<td>10-30%</td>
</tr>
<tr>
<td>Computer Programs/Project</td>
<td>10-20%</td>
</tr>
<tr>
<td>Quizzes/Tests</td>
<td>20-50%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>30-50%</td>
</tr>
</tbody>
</table>

Syllabus prepared by: I. Cialenco and T.R. Bielecki
Date: November, 2013