Course Outline: ACSC316 Winter 2014
Mathematics of Finance III Derivative Pricing

Tuesdays and Thursdays 1:00-2:15pm RIC209
Final Exam April 24, 2:00-5:00pm

Instructor
Peter Douglas, CW 307.24
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Office Hours
Mondays, Tuesdays and Thursday 9:00-11:00 am
Other times by appointment (note that I am off campus on Wednesdays and many Fridays)

Text: *Derivative Markets* (Second or Third Edition) by McDonald, Robert L. Chapters 9-13,18-24

Other Materials: A class website will be maintained URCourses. This will contain electronic copies of assignments, solution sets and other items of interest. There will be no paper handouts provided in class.

Overview

ACSC316 covers the pricing of European and American style options on investment vehicles including stocks, currencies, commodities and indices. At the end of the term, students will be expected to:

1) Use put-call parity to determine the relationship between prices of European put and call options and to identify arbitrage opportunities.
2) Calculate the value of European and American options using the binomial model.
3) Calculate the value of European and American options using the Black-Scholes option-pricing model.
4) Identify the situations where the values of European and American options are the same.
5) Interpret the option Greeks.
6) Explain the cash flow characteristics of the following exotic options: Asian, barrier, compound, gap, and exchange.
7) Explain the properties of a lognormal distribution and explain the Black-Scholes formula as a limited expected value for a lognormal distribution.
8) Explain what it means to say that stock prices follow a diffusion process.
9) Apply Itô's lemma in the one-dimensional case.
10) Simulate lognormal stock prices.
11) Explain and demonstrate how to control risk using the method of delta hedging.

This material forms learning objectives B and C under Society of Actuaries Exam MFE (or Casualty Actuarial Society 3F). In addition, if time allows the course will cover the interest rate models covered under Learning Objective A of exam MFE/3F. Students who obtain a minimum grade of 80% in ACSC316 will be eligible for exemption from exam MFE under the Canadian Institute of Actuaries University Accreditation Program.

Course Requirements

1) An awareness of the U of R General Calendar.

2) Pre-requisites for this course are ACSC216 and STAT251. In addition, it is suggested that students have completed ACSC318 or be taking ACSC318 simultaneously with ACSC316.

3) Completion of 10 class assignments. Typically assignments will be posted on URCourses each Thursday and due the following Thursday. No credit will be granted for late papers. For many assignments, it is recommended that students use of Excel or similar packages. At least one assignment will take the form of a group project including an in class presentation.

4) Two midterm exams to be written in class time on February 13th and March 25th.

5) One 3-hour final exam scheduled for Thursday April 24th from 2-5pm.

6) A tentative class schedule has been posted on the class website. This will be updated during the term.

7) Alternate arrangements for midterm and final exams may be made at the discretion of the instructor for students who provide prior notice and adequate documentation. However, the instructor reserves the right to deny such arrangements for students who have not completed the course assignments to date.

8) For the midterm and final exams, students are required to bring photo ID a non-programmable pocket calculator**.** The instructor will not spare provide calculators for the midterms or final exam.

9) Programmable calculators, laptop PCs and other electronic devices will not be permitted in the exams room.

10) The tables and formula sheets for Course MFE will be provided for the exams. These can be found online at the SOA website and at the class website.

Grading

Final grades will be based in on the higher of:

A) Class average calculated as follows:
   i) Assignments 20%
   ii) Midterms 30% (i.e. 15% each)
   iii) Final Exam 50%

The instructor reserves the right to

a) Fail a student who does not pass the final exam
b) Refuse to allow a deferred final to a student who has not completed the requirements of the course, or who does not receive a passing average for the two midterms.