Finance 5350-001 Mathematical Finance Tuesday & Thursday 5:30 – 6:50pm Room 252 Business Building Fall 2007

Instructor:Dave DiltzOffice:434C BusinessOffice Hours:Tue, Thu 4:00-5:30pm

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I. Course Objective and Prerequisites

- a. The object of the course is to introduce concepts and principles of mathematical finance.
- b. Students are expected to have some background in basic undergraduate differential and integral calculus, graduate level microeconomic theory, and econometrics.

II. Student Learning Outcomes

a. Students will be able to:

- i. Find the arbitrage-free price for any contingent claim in the Binomial model.
- ii. Solve stochastic differential equations using Ito's formula.
- iii. Determine whether a given stochastic process is a martingale.
- iv. Derive the Black-Scholes partial differential equation.
- v. Derive the Black-Scholes European Call Option Pricing Formula.

III. Course Requirements & Procedures

a. Materials

- i. Course Text: *Arbitrage Theory in Continuous Time, Second Edition*, by Thomas Björk, Oxford University Press, New York, 2004.
- ii. Optional Supplements:
 - 1. *Financial Calculus*, by Martin Baxter & Andrew Rennie, Cambridge University Press, 1996.
 - 2. *Investment Under Uncertainty*, by Dixit & Pindyck, Princeton University Press, 1994.
 - 3. *Options, Futures, and Other Derivatives, Sixth Edition*, by John Hull, Prentice Hall, New Jersey, 2006.
 - 4. Journal articles and supplemental references as assigned in class.

b. In the Classroom

i. Lectures are designed to clarify and supplement text material. Unless otherwise instructed, you will be held responsible for all reading assignments (even if they are not covered in lecture) plus all supplementary material presented in lecture.

c. Grading

- i. Grades will be based upon your performance on attendance, one midterm exam, and the final exam as follows:
 - 1. Exam I 30%
 - 2. Exam II 30%
 - 3. Cumulative Final Exam40%
- ii. Grades will be awarded on a competitive basis.

IV. Academic Calendar

First day of classes August 27		
Labor Day Holiday	bor Day Holiday September 3	
Census date	September 12	
Midsemester	October 19	
Thanksgiving	November 22	
Last day of classes	December 7	
Finals week	k December 10 – 14	

V. Course outline

Month	Day	Торіс	Björk Chapter
August			
	28, 30	Introduction	1, 2
September			
	4, 6	Binomial Model	2, 3
	11, 13	Mathematics Background	Appendices A – C
	18, 20	Stochastic Calculus & Ito's Formula	4
	25, 27	Stochastic Calculus (Continued)	4
October			
	2, 4	EXAM I Thursday, October 4	1 – 4
	9, 11	Stochastic Differential Equations (SDEs)	5
	16, 18	Portfolio Dynamics	6
	23, 25	The Black-Scholes Model	7
November			
	Oct. 30, Nov. 1	The Black-Scholes Model (Continued)	7
	6, 8	Martingales & Girsanov's Theorem	10 (Sec. 7), 11
	13, 15	EXAM II Thursday November 15	5 – 7, 10 (Sec. 7), 11
	20	Martingales & the Black-Scholes Model	12
	27, 29	Bonds & Interest Rates	20 – 21
December			
	4, 7	Short Rate Models	21 – 22
	11	FINAL EXAM 5:30 – 8:00pm	1 – 7, 11 – 12, 20 – 22

University Policies

Academic Dishonesty: All students are expected to pursue their scholastic careers with honesty and integrity. It is the philosophy of the University of Texas at Arlington that academic dishonesty is unacceptable and will not be tolerated. Anyone involved in academic dishonesty will be disciplined in accordance with University regulations, which may include suspension or expulsion from the University.

"Academic dishonesty includes, but is not limited to, cheating, plagiarism, collusion, submission for credit of work attributable in whole or part to another person, taking an exam for another, or any act designed to give unfair advantage to a student or the attempt to commit such acts." Regents' *Rules and Regulations*, Part One, Chapter VI, Section 3, Subsection 3.2, Subdivision 3.22. Institutional procedures regarding academic dishonesty are outlined in Part II, Chapter 2, of the *Handbook of Operating Procedures of the University of Texas at Arlington.*

Grade Grievances: The student has one calendar year from the date the grade is assigned to initiate the grievance. The normal procedure begins with the department chair, to the academic dean, to the Provost.

The Americans with Disabilities Act: The University of Texas at Arlington is committed to the spirit and letter of the ADA, making reasonable adjustments in the classroom as necessary to eliminate discrimination on the basis of disability. Students should meet with the instructor during the first week of class in order to advise the instructor of any special needs, abilities, or limitations. Any disclosure by the student will be kept confidential and disclosed on a need-to-know basis only.

Students need to contact the University's Office for Students with Disabilities prior to contacting the instructor about any disabilities. The student should provide the instructor with written documentation of the disability from acceptable sources and from the Office for Students with Disabilities.

Absences Based on Religious Beliefs: A student who misses class work due to the observance of a religious holiday will be given the opportunity to complete the missed work within 15 days following the due date of the work. To be eligible for make-up, the student must notify the instructor prior to the holiday.

Bomb Threats: Effective April 8, 1997, the College of Business Administration has adopted a policy to deal with the classroom disruption caused by bomb threats in the building. [A] Section 22.07 of the Texas Criminal Law Statutes governs terrorist threats and classifies bomb threats as Class A misdemeanors. Section 12.21 of the Texas Criminal Law Statutes states that a Class A misdemeanor is punishable by (1) a fine not to exceed \$4,000, (2) a jail term of not more than one year, or (3) both such a fine and confinement. [B] If anyone is tempted to call in a bomb threat, be aware that UTA will soon have technology to trace phone calls. [C] Every effort will be made to avoid cancellation of presentations and exams caused by bomb threats to the Business Building. Unannounced alternate sites will be available for these classes. If a student who has a class with a scheduled test or presentation arrives and the building has been closed due to a bomb threat, the student should immediately check for the alternate class site notice posted on/near the main doors on the south side of the Business Building. If the bomb threat is received while class is in session, Your instructor will ask you to leave the building and reconvene at another location. [D] Students who provide information leading to the successful provide a reward to anyone providing information leading to an arrest. To make anonymous report, call 817-272-5245.

Attendance Policy: Students are expected to attend each class and students are expected to come to each class with their assignments completed. Any student who must miss a class is responsible for securing any and all assignments for course work missed.

Drop Policy: These policies include by reference all provisions for grade adjustment or drop policies included in the applicable Graduate or Undergraduate Catalog in effect at the start of the semester. It is the student's responsibility to complete the course or withdraw from the course in accordance with University regulations. No student will be dropped from the class rolls for absences. Students are strongly encouraged to verify their grade status before dropping a course after the first withdrawal date. A student who drops a course after the first withdrawal date may receive an "F" in the course if the student is failing at the time the course is dropped.

Drop for Non-Payment: It is the policy of the University of Texas at Arlington that students who have not paid by the census date and are dropped for non-payment cannot, under any circumstances, receive a grade for the course. Therefore, a student dropped for non-payment who continues to attend the course will not receive a grade for that course. Emergency loans are available to help students pay tuition and fees. Students can apply for emergency loans by going o the Emergency Tuition Loan Distribution Center at E.H. Hereford University Center (near the southwest entrance).

Student Evaluation of Teaching: The following appears in Administrative Memorandum No. 98-5, dated August 21, 1997, from the President to academic and administrative offices: "Beginning in Fall 1997, teaching evaluations will be conducted in every class every semester for every instructor of record."