Georgia Institute of Technology

MGT 4068 -Fixed Income Securities

College of Management, Spring 2012, Location: the Trading Floor

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For whom is this course?

- Planning a career in trading, fixed income derivatives, security research, risk management, corporate finance, regulation/supervision, central banking, academia or if you are just generally curious.

Course description

This course covers the important securities that traded in the fixed income market and the valuation models that are used to price them. The course emphasizes traditional bond and term structure concepts which are crucial to the functioning of the fixed-income market. Students will learn the basic tools that are useful for: (1) Valuing securities whose cash-flows depend on interest rates, (2) Managing the risk of portfolios of fixed income securities, and (3) Determining the optimal exercise policy for a variety of options that are embedded in fixed income securities. At the end of the course, students will be introduced to credit risk derivatives and their role in the recent financial crisis.

Course objective

- Gain a broad overview of the issues in fixed income and credit risk
- Understand the basic risk-free term structure models and sensitivity measures
- Develop basic understandings of the techniques for valuing fixed income securities and credit risk derivatives
- Understand the shortcomings of the available modelling approaches for fixed income and credit risk securities

  "Any virtue can become a vice if taken to the extreme, and just so with the application of mathematical models in finance practice [...]. The mathematics of the models are precise, but the models are not, being only approximations to the complex real world" Robert Merton (1993).
- Understand the mathematics of bond market, i.e. yield, duration, and convexity
- Understand the risks that underlie the risk-free term structure models

My personal note on this course

- Modern fixed income analysis is characterized by a quantitative approach. A good quantitative aptitude will help you excel in this course. I find that students with less quantitative background often take more time to develop the understanding of derivative pricing and bond valuation. Therefore, it is important that you stay on top of the lecture notes as well as on the assigned reading.

- We will be using a substantial amount of basic calculus, algebra, and statistics. Please review your knowledge of mathematics. I have posted on the T-square, a document which reviews the mathematics that you are required to know for this course.
- Some of the materials covered in the course may seem *technical and theoretical*. Of-the-shelf software solutions are readily available for many derivatives applications. However, I believe that a thorough understanding of the fundamentals of derivative valuation is essential. First, without knowing how the models are developed, you cannot predict when they will break down. Second, you may not always come across standard problems for which well developed models exist. Therefore a good theoretical foundation will empower you to cope with these situations.
- I believe in a *hand-on* learning approach. This is a practical course and thus it is important that you can apply what you learn to real financial data. I will rely heavily on the Excel spreadsheet for the exposition of the materials. Although prior knowledge of the Microsoft Excel is not required, it is highly recommended that you learn it as soon as the semester starts. I will ask my TA to hold a few Excel tutorials during the two weeks of the semester.

Prerequisites

Students are expected to have taken, or concurrently taking MGT 3076 (or an equivalent course).

Textbooks and lecture notes

Required: (1) *Fixed-income Securities: Valuation, Risk Management and Portfolio Strategies*, 2003, Lionel Martellini, Philippe Priaulet, and Stéphane Priaulet, John Wiley and Sons. **(2)** Additional readings on credit derivatives will be handed out in class.

Suggested reference: (Highly recommended): Subscription to The Wall Street Journal. Student subscriptions are available at a reduced rate. Although this is not required, I strongly recommend it for the following reasons: (1) We will discuss articles from The Wall Street Journal at the beginning of every class, (2) Knowledge of financial news will help you get a job in this highly competitive industry!

Course materials: Slides and Excel spread sheets used during the classes will be posted on T-square. Although the materials may be available prior to a class, they will be updated and amended as the course progresses.

Evaluation

Your grade will be based on the following weighted average:

2 Class tests	50 %
Attendance & Participation	15 %
Assignments	35 %

Class tests: in class, 85 minutes each, closed-book, non-programmable calculator. Formulae sheets will be presented one lecture prior to each examination. Each test is worth 25% of your final mark. The first class test is on **Monday, February 20th, 2012**. The second class test is on **Monday, April 16th, 2012**. There will be no makeup test if you fail to write the test on the scheduled time and date. The only exceptions are

when you can provide me with a proof of absence that is due to either personal sickness, serious accident (or death) in your immediate family, prescheduled job interview, and jury duty.

Attendance & Participation: Attendance is **mandatory** for this course. Attendance is 10% of your mark, while the other 5% will be from your participation. For most classes, you will be working with Excel spreadsheets. If you do not come to class, you will not learn the materials and hence will not be able to do your assignments. There will be up to ten random attendance checks throughout the semester. Your attendance mark will be based on these random attendance checks. If you miss more than 6 random attendance checks, you *will be given a failing letter* grade. If you have a prior engagements that must subject you to a class absence, please notify me before the class through e-mail.

Assignments: There will be three assignments during the semester. The first is worth 5%. The second assignment is worth 10%. The third assignment is worth 20% of your total mark. The third assignment will be cumulative of the materials that you learned throughout the course. Students are encouraged to work in groups of up to four people and hand in a single *well-presented* report. The report will be marked based on the results as well as on its presentation. I will assign you into groups for the first assignment. After, you can choose your own group of up to four students. However, your group members for the second and third assignments must be the same.

Re-grading: All re-grade requests must be made in writing within one week following the day that the class tests are returned. If you submit a question to be re-graded, your entire test must be re-graded. As a consequence, the mark from your re-graded test could be higher or lower. Regardless, the mark from your re-graded test is final.

Final letter grade: Your final letter grade for the course will be based on your performance relative to the class distribution.

Class room & Trading floor

All lectures will be held in the trading floor lab. These trading floor sessions are dedicated to the Excel spreadsheet modeling. Please do not bring food to the trading floor lab.

Tentative schedule and topics

See the attached sheet for tentative schedule of the classes. Ideally, I would like to follow this schedule. However in practice, I expect several changes on this schedule as the course progresses. Depending on the readiness of the students and time constraint, the contents covered in this course may change.

Class Etiquette

I welcome questions during lectures. Feel free to stop me to ask a question during my teaching.

I ask that you follow some simple courtesy rules during class: arrive on time, do not leave during class, do not talk while I am talking, do not talk while your peer is asking a question, and make sure cell phones are turned off. I will not restrict laptop usage during the class as long as it is for course-related purposes. I also ask that you do not use Email or visit social network sites, i.e. Facebook, Twitter, MSN messenger during class.

Georgia Tech policy

Students are expected to adhere to the Georgia Tech Honor Code. Substantial documentation on the code is available at: www.honor.gatech.edu. Please feel free to ask me if you need additional clarifications about this issue. Cheating and plagiarism of any kinds will not be tolerated in this course.

Acknowledgements

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Course Schedule MGMT 4068 - Spring 2012
Professor: Chayawat Ornthanalai **Office:** 403

Week 1		Materials
Mon	9-Jan-12	**Introduction & Motivation**
	Lecture	
		Overview of the course
		What is the students' expectation?
		Preview of the credit risk derivatives
		Chapter 1 - PART I
		Introduction to the taxonomy of Fixed-Income
Wed	11-Jan-12	**Chapter 1 - PART II**
		Section: All
		Case Study: Crisis in Orange County

Week 2		Materials
Mon	16-Jan-12	School holiday - No class
Wed	18-Jan-12	**CHAPTER 2 - Bond Pricing & Yields**
		Section: All

Week 3		Materials
Mon	23-Jan-12	**CHAPTER 2 - Bond Pricing & Yields**
		Assignment # 1 - Handed out
Wed	25-Jan-12	
		CHAPTER 2 - Bond Pricing & Yields

Week 4		Materials
Mon	30-Jan-12	**CHAPTER 3: Empirical Properties of Classical theories of the term structure**
		Section: All except remark 3.1
		Students not responsible for Example 3.1
Wed	1-Feb-12	**CHAPTER 4: Deriving the zero-coupon yield curve**
		Excel lab session on deriving zero-coupon yield curve

Week 5		Materials
Mon	6-Feb-12	**CHAPTER 4: Deriving the zero-coupon yield curve**
		Excel lab session on deriving zero-coupon yield curve
Wed	8-Feb-12	**CHAPTER 5: Hedging interest-rate risk with duration**
		CHAPTER 5: Excel Lab session on Hedging interest rate risk

Week 6		Materials
Mon	13-Feb-12	**CHAPTER 5: Hedging interest-rate risk with duration**
		CHAPTER 5: Excel Lab session on Hedging interest rate risk
		Assignment # 1 due before class
Wed	15-Feb-12	**Review for Class Test # 1**
		Case Study: Additional reading

Week 7		Materials
Mon	20-Feb-12	**CLASS TEST # 1 - Closed Book - 80 minutes**
		Formulae Sheet provided
Wed	22-Feb-12	**CHAPTER 5: Hedging interest-rate risk with duration**
		CHAPTER 5: Excel Lab session on Hedging interest rate risk

Week 8		Materials
Mon	27-Feb-12	**CHAPTER 6: Beyond duration**
		CHAPTER 6: Excel lab session
Wed	29-Feb-12	**CHAPTER 6: Beyond duration**
		CHAPTER 6: Excel lab session
		Assignment # 2 - Handed out

Week 9		Materials
Mon	5-Mar-12	**CHAPTER 6: Beyond duration**
		CHAPTER 6: Excel lab session
		CHAPTER 6: Beyond duration
Wed	7-Mar-12	CHAPTER 6: Excel lab session

Week 10		Materials
Mon	12-Mar-12	**CHAPTER 6: Beyond duration**
		CHAPTER 6: Excel lab session
Wed	14-Mar-12	**CHAPTER 10: SWAPS**

Week 11		Materials
Mon	19-Mar-12	**Spring Break - No class**

Wed	21-Mar-12	**Spring Break - No class**

Week 12		Materials
Mon	26-Mar-12	**CHAPTER 10: SWAPS** **Assignment # 2 due at 9pm**
Wed	28-Mar-12	**CHAPTER 10: SWAPS** Excel lab session

Week 13		Materials
Mon	2-Apr-12	**CHAPTER 10: SWAPS** Excel lab session **Assignment # 3 - handed out**
Wed	4-Apr-12	**CHAPTER 10: SWAPS** Excel lab session

Week 14		Materials
Mon	9-Apr-12	**Credit Risk: CDS Pricing Part I** Excel lab session
Wed	11-Apr-12	Review for the Class Test # 2 Formula sheet for the midterm is handed out

Week 15		Materials
Mon	16-Apr-12	**Class Test # 2 - In class, closed-book, formula provided, 80 minutes**
Wed	18-Apr-12	**Credit Risk: CDS Pricing Part II** Excel lab session

Week 16		Materials
Mon	23-Apr-12	**Credit Risk: CDS Pricing Part III**
Wed	25-Apr-12	**LAB session : Question and answer for Assignment 3**
Wed	2-May-12	**Assignment 3 - Due by 9 pm** **Peer Evaluation due by 9 pm**