**B40.3333.10**  
**DEBT INSTRUMENTS AND MARKETS**  
**NEW YORK UNIVERSITY, STERN SCHOOL**

Syllabus  
Fall 2010

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**Course Description**  
This course describes the important fixed income securities and markets, and in turn develops tools for valuing these securities and managing their interest rate and credit risk. Because of the financial crisis of 2007-2009, a special effort will be made to integrate each lecture with financial crisis material. Historically, fixed-income refers to securities which promise fixed cash flows over their lives. Now, we generally view any fixed-income instrument as one in which its value depends on the level of interest rates and/or the health of the underlying assets. Thus, along with an analysis of fixed-rate bonds, we will also look at other securities, such as floaters, inverse floaters, bond options, caps/floors, callable bonds, interest rate swaps, credit default swaps and mortgage-backed securities.

The study of fixed income securities is highly quantitative in nature. Students should be comfortable with mathematics such as algebra, linear algebra and basic calculus, as well as statistical concepts such as probability distributions, mean, variance, covariance, and regression. A basic background in finance is required, such as the core course, *Foundations in Finance*. Although some previous coursework in options is helpful, it is not necessary to have taken an options course as the analysis of fixed-income derivatives will be self-contained. Students will need to use a calculator that can raise a number to an arbitrary power, and are expected to be very familiar with a spreadsheet package like *Excel* (including, for example, its solver function). It is my experience that if students do not satisfy this criteria, then they tend to struggle in the class.
**Course Materials**

The main course material is a collection of presentation slides which will be used in each lecture. Hardcopies of these slides are available online and also will be distributed at the start of each class. Students should make notes directly onto their hardcopy, and thus can spend more time listening and participating in the lecture. A secondary course material is a collection of readings, which are generally background readings for the upcoming lecture. These materials will be handed out periodically during the semester.

There are many fixed income books out in the marketplace. If you do not have a fixed income textbook and are interested in purchasing one that somewhat resembles the approach of this course, I would recommend either:


While neither of these books corresponds that closely to the course notes, the Veronesi book comes closest. It is also recent and incorporates the current financial crisis, and contains more institutional detail. If you were going to go with one, I would go with Veronesi. In any event, I will include appropriate page references with the distributed slides, and solutions to both the Tuckman questions at the back of the University edition of the book and Veronesi questions at the back of each chapter (on Blackboard).

The books are substantially discounted online at Amazon.com or at sites that sell university books. For this reason, the book is not on NYU’s bookstore shelves.
Course Requirements
Grades will be based on exam scores and a written assignment: midterms (30% each), final (50%), written assignment (20%) and problem sets (borderline cases). Historically, approximately 20% of the class is affected on the borderline.

With respect to the exams, you are allowed one 8.5x11 inch page of notes for the midterm and two 8.5x11 inch pages of notes for the final.

With respect to the written assignment, it will be handed out on November 15th and must be returned by November 29th. More details are to follow.

With respect to problem sets, because the material in the course is analytical and new concepts build on old ones, it will be essential to do the problem sets in order to follow the lectures and succeed on the exams. The problem sets will be graded +, √, - or NC. Answers will be handed out one week after the problem set is handed out. Along with the problem sets, excel spreadsheets will be handed out that help perform various calculations. In terms of handling exam questions, however, I encourage students to work through the problem sets with pen in hand. The spreadsheets are partially provided to let students explore the topics further.

Grading
At NYU Stern we seek to teach challenging courses that allow students to demonstrate differential mastery of the subject matter. Assigning grades that reward excellence and reflect differences in performance is important to ensuring the integrity of our curriculum.

In general, students in this course can expect a grading distribution similar to that used in our core courses, where:

- 25-35% of students can expect to receive A’s for excellent work
- 50-70% of students can expect to receive B’s for good or very good work
- 5-15% of students can expect to receive C’s or less for adequate or below work

Note that while I will use the above as a guide, the actual distribution for this course and your own grade will depend upon how well each of you actually performs in this course.

On the next page, I provide a tentative schedule for the lectures in the class.
TENTATIVE SCHEDULE OF LECTURES

**Topic I: Introduction & Valuation of Fixed Cash Flows**
A brief course overview and review of basic valuation. This part of the course covers the valuation of fixed cash flows, including an analysis of the discount function, no arbitrage valuation, bond portfolio replication, and important concepts such as yield-to-maturity and forward rates. (September 27).

**Topic II: The Interest Rate Sensitivity of Instruments with Fixed Cash Flows**
This part of the course covers the interest rate sensitivity of fixed cash flows, including the important concepts of duration and convexity, and how these concepts apply to a portfolio of securities. These tools are then used to show how to hedge the interest rate risk of securities with fixed cash flows. (October 4, 11).

**Topic III: Introduction to Variable Cash Flows**
These lectures provide an introduction to markets with variable cash flows. As a starting point, we discuss the valuation and interest rate sensitivity of floating rate notes and inverse floaters. We also cover one of the more important securities in the fixed income market, the interest rate swap. (October 11, 18).

**Topic IV: Repo Markets**
This lecture covers the basics of the repo market, one of the primary ways fixed income securities are financed. Special attention is paid to the impact of the repo market on the financial crisis. (October 18)

**Topic V: Valuation and Interest Rate Sensitivity of Interest-Rate Dependent Cash Flows**
This part of the course covers the techniques for valuing cash flows which depend on interest rates. The lectures will include a description of the major characteristics of interest rates, the development of a popular, Wall Street one-factor model of interest rates, and a valuation and hedging methodology for this model. (October 25).

**MIDTERM (November 1)**
The midterm covers material through October 25.

**Topic VI: Fixed-Income Options**
These lectures will focus on the valuation of fixed-income options, and embedded options in fixed-income securities. As options are a building block for many securities, these lectures are crucial for the understanding of later concepts. I will start with an overview of options, and then show how to value options and measure their interest rate sensitivity using the valuation framework within a one-factor setting. (November 1).

**Topic VII: Fixed-Income Options - Applications**
This part of the course covers important applications of interest rate options, in particular, common embedded options in the fixed-income market such as (i) callable bonds, (ii) caps, floors or collars, and (iii) swaptions. (November 8, 15).

**Topic VIII: The Credit Market**
This topic covers the important area of credit markets. In order to value fixed income securities that face credit risk, it is necessary for us to build a second factor, namely that of the underlying assets of the firm. After building this model, we will show you how to value bonds of different priority and the underlying equity of the firm. The final application will be to discuss the motivation, pricing and risk of credit default swaps. (November 15, 29).

**Topic IX: The Mortgage-Backed Securities Market**
This lecture provides a brief description of the mortgage market, including mortgages, mortgage-backed securities and collateralized mortgage obligations. Issues associated with the distribution rules for cash flows and a method for valuing and measuring the interest rate sensitivity of mortgage backs will also be discussed. (December 6, 13).

**Topic X: Course Review**
An overview of the important concepts of the course. (December 13)

**FINAL EXAM (December 20)**