1. Course Description

This course covers the methodologies used to manage financial risk. Emphasis is given to fixed income markets. The topics covered are:

1) An overview of fixed income products.
2) Duration and Convexity.
4) Value at Risk.
5) Liquidity and Credit risk.

Each topic is motivated by practical issues that arise in the process of managing financial risk. This course is very quantitative and requires basic familiarity with a variety of advanced mathematical concepts, such as partial derivatives and Taylor expansions.

2. Course Objectives

After completing this course you should be able to:

1) Understand and apply the concepts of duration and convexity to hedge the interest rate risk of a corporation.
2) Describe the most common fixed income products and their risks.
3) Describe the usual problems related to the risk management process in a corporation.
4) Calculate the VaR of a simple portfolio.
5) Describe simple credit derivatives.
3. Prerequisites

Students must be comfortable with calculus and statistics. Some homework assignments will require the use of Excel. The course is very demanding. The average student can expect to spend 8 hours/week outside the class on this course.

4. Course Requirements

The course requirements consist of problem sets, case studies and a take home final exam.

5. Problem Sets

Problem sets contain exam-type questions and computer exercises meant to help you practice on your own. Problem sets will also contain questions about the cases studies. I require that you work in a group of students, with a minimum of 2 students and a maximum of 4 students per group. Only one copy of the (joint) homework should be turned in. Please try not to change groups during the quarter. If you must change group, write a very clear and visible note on the cover of the first problem set after the change. I will ask you to evaluate the performance of the members of your study group in the last day of instruction. **This peer evaluation will account for 20% of your course grade.** Solutions to the problem sets will be provided for you.

If the solutions that you provide for the problem set show some serious effort then you will receive full grade for the problem set. If the solutions do not show any degree of effort then you will not receive a grade for the problem set.

6. Case Studies

Case studies will be discussed in the course. Students must be fully prepared to participate actively in the case studies discussion.

**Class participation during the cases discussion will be 20% of your grades.** I will assign 0 if you do not talk, 20 if you say something reasonable, 40 if you say something really interesting. **Please display your name plates during the classes,** otherwise I will not be able to assign you a grade for class participation in the first case studies classes. **I will cold call students.** If you feel that you are not prepared to discuss a case, please tell me so before the class. Otherwise, I may call you.

7. Questions and Office Hours

Send me an e-mail if you have any questions. I welcome your feedback on every aspect of the course. If you would prefer to be anonymous drop a note in my MKZ 268 mailbox. If you think that you will need extended help, please e-mail me to make an appointment.
I encourage you to participate in the class. Don’t be shy about asking questions to clarify what we are discussing. Every lecture and the course as a whole build on what we learned previously, so being lost gets very costly very quickly.

9. Exams and Grading

The problem sets, the case studies participation and the final will be graded from 0 to 40 points. Your course grade is:

\[
\frac{(0.4 \times \text{final grade} + \\
0.2 \times \text{problem sets grade} + \\
0.2 \times \text{case studies participation} + \\
0.2 \times \text{peer evaluation})}{10}
\]

The final exam questions will be very similar to the problem set questions. The final exam is a take home exam. The questions for this exam will be given to you in the last class of the course. The final exam is strictly individual. If you cannot find me, you may leave your answers below the door of my office (MKZ 267).

I will not tolerate any form of cheating. This includes inquiring or exchanging information with other students during the exam.

The re-grading policy for exams is:

1) If you think that a question in your exam was graded incorrectly, then write a very precise description of your concern and give it to me with your exam.
2) I will re-grade your entire exam. There is no guarantee that the grade initially assigned will not be lowered.
3) Re-grading of exams will only be considered within seven days of your receiving your graded exam back.

10. Class Attendance

Class attendance is not mandatory. However, I expect you to be present at all classes and most importantly at the classes with cases-discussion. I expect you to arrive on time for the class but if you arrive late, please do so in way that does not disturb the class.

11. Academic Accommodations

To request academic accommodations due to disability, please contact disabled Student Services, 448 Schmitz, (206) 543-8914 (V/TTY). If you have a letter from Disabled Student Services indicating that you have a disability that requires academic accommodations, please present the letter to me so we can discuss the accommodations you might need in this class.
12. Administrative Notes

The class notes are in a packet sold at the University bookstore. Additional material used in the classes are in my web page.

13. Texts

The following material is **required** in this course:

1) Packet of readings

The following material is **recommended** in this course:


5) Sundaresan, S., Fixed Income Markets and Their Derivatives, South-Western. (On reserve at Foster library.) This book is about fixed income markets. If you think that you will end up working at the treasury department of a big corporation or at a fixed income trading and sales desk then I highly recommend this book.

The following book is totally optional

1) Liar's Poker: Rising Through the Wreckage on Wall Street by Michael Lewis (fun reading).

14. Course Outline and Readings

The readings marked with the sign “•” are required.

1) **The Rationale for Financial Risk Management**

   1.1 No-Arbitrage (Review of Finance 461/561)

       Interest rate compounding;
       Basic Derivative Contracts;
       Forward contracts and Future contracts;
       Option contracts;
       Payoff diagrams, Bull Spread.
       The No-Arbitrage Principle;
       Pricing Futures and Forwards;
The Binomial Model for Asset Prices;
Applying no-arbitrage to price an option with the binomial model
The risk neutral probabilities and derivative prices as expectations;
The volatility of the underlying asset and its effects in option prices;
The Black and Scholes, the Greeks and Delta and Gamma hedging example;


McDonald’s chapters 1 to 3

Hull Chapters 1 and 9 to 12 (5th edition) or 1 and 10 to 13 (6th edition)

1.2 Why Manage Risk?

- Why Manage Risk? (HBS note # 9-294-107)

- Case: American Barrick Resources Corporation: Managing Gold Price Risk (HBS# 5-296-064)

McDonald’s chapter 4

2) Interest Rate Risk Management

2.1 An overview of Fixed Income Products and Risks
Classification of Debt Securities;
Overview of Risks Associated with Fixed Income Securities;
Basic conventions and definitions;
REPO, FRA, Strips;
Swaps, Floating Bond Pricing, Swaps Pricing;
Credit ratings and agencies, spreads and OAS;
Curve fitting;
Macro economic news;

Sundaresan Chapters 1, 4, 5 and 6

McDonald’s chapter 8 (Interest rate swaps only)

Hull Chapter 5 and 6 (Interest rate swaps only) in both 5th and 6th edition.

2.2 Fixed Income Portfolio Management Tools
   Duration, PVBP;
   Swaps PVBP;
   Convexity; Negative convexity;
   Most Common Term Structure Movements - Principal Components Analysis (PCA)

McDonald’s chapter 7

Hull chapter 22 or chapter 26 in 6th edition.

Sundaesan chapter 12

- Case: Union Carbide Corporation Interest Rate Risk Management (HBS #9-294-057)

3) A More Realistic Model for Asset Prices and Introduction to VaR

3.1 Introduction to Stochastic Calculus;
   Brownian Motion;
   Stochastic Differential Equations;
   Monte Carlo simulation;
   Calculating expected values;

McDonald’s chapter 23

Hull chapters 11 and 12.4 and 13 (5th edition) or 12 and 13.4 and 14 (6th edition)

3.2 VaR

- An Overview of Value at Risk, Duffie and Pan Journal of Derivatives, Spring 1997, 7-49

McDonald’s chapter 25

Hull Chapter 16

• Case: Aspen Technology Inc. Currency Hedging Review (HBS case# 9-296-027)

4) Credit derivatives

• An Overview of Credit Derivatives (HBS #9-297-086)

• Citibank Hong Kong – Capital Arbitrage in the Financial Markets (HBS # 9-298-029)

  McDonald’s chapter 26

  Sundaresan chapter 18

5) Liquidity Risk

• Long Term Capital Management, L.P. (A) (HBS # 9-200-007)