

Syllabus: Financial Derivatives (FIN 361)

Spring 1439/1440

2018/2019

Section 50782

Pre-requisite: FIN 220

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**Office hours:** Sunday, Tuesday, Thursday 11:00 AM-01:00 PM

Monday 11:00 AM-1:00 PM

or by appointment

### Course Description

This course presents and analyzes a distinct type of financial securities called derivatives. The global derivatives market is the most rapidly growing market, as the notional global market value of derivatives in December 2016 was USD \$483 trillion. Hence, it is important to understand both the strategic opportunities offered by these derivative instruments and the risks they imply.

After a brief introduction to derivatives, the first section of this course examines a broad range of derivative products and markets, and discusses how risks are managed by users of derivatives. The fundamental principle underlying this material – pricing by no arbitrage. The second section of the course will explore forward and futures contracts including pricing and applications such as hedging with forwards and futures. The third section of this course will study swap markets and their risk applications. Section 4 presents derivative securities with option-like payoffs with an emphasis on no arbitrage pricing restrictions, and describes how they are used to hedge different kinds of risk. Section 5 analyzes option pricing in a mathematical approach, and presents well known models in options valuation such as the binomial tree model and the Black-Scholes-Merton option pricing model. This section also discusses hedging with options, and applications of option pricing. Section 6 discusses options strategies used to manage corporate risk. The final section of the course will present some issues of current concern like the use of derivatives in hedging risk during the global financial crisis.

### Course Objectives

Upon successful completion of the course, you should be able to:

1. Understand the concept of derivative contracts
2. Understand the characteristics of various derivatives and explain the differences among them.
3. Understand the intuition and gain skills on pricing of forward, futures, and swap contracts using no-arbitrage principle.

4. Understand the intuition and gain skills on pricing options using the binomial tree method and the Black-Scholes-Merton model.
5. Understand how financial institutions hedge their risks by trading derivatives.

### Prerequisites

Students should have a good knowledge of basic finance concepts, including risk, return, arbitrage, efficient markets, and the time value of money. Additionally, students should be comfortable with statistics (e.g. expected values, standard deviations and probability distributions) and math-calculus (e.g. differentiation, integration, exponential functions and natural logarithms). The course will involve a good amount of numerical calculation and modelling using a computer. Therefore, fluency in the use of a spreadsheet package such as MS Excel is essential.

### Course Requirements and Grading

Your final grade will be based on your performance on the three exams, review quizzes, and assignments.

*Grading distribution:*

First Midterm Exam	20%
Second Midterm Exam	20%
Participation	10%
Assignments	10%
Final Exam	40%

**Exams:** There are a total of 3 *closed-book* and *closed-notes* exams in this course: two midterm exams and a final exam.

The two midterm exams will be on the materials covered up until the exam date. It will be administered during class time.

The final exam will be administered during the Final Exams Week. This exam assumes that the student has knowledge on all of the required course materials, but will likely focus more on the last half of the course materials. **Important Note:** Under no circumstances, there will be a replacement test. If a student did not write any of the exams, he will receive a mark of zero for that exam.

**Review Questions:** Students are required to complete the review questions posted after each chapter is covered. Students will receive a mark if they completed all the questions before the due date, which is within one week from the time they are posted. Students' mark will be calculated according to the following formula:  $\frac{\text{Number of review questions completed}}{\text{Total number of review questions}} \times 8$ .

**Assignments:** I plan to give three assignments. Students will be graded based on the best two assignments out of three. The purpose of the assignments is to give students an opportunity to apply what they learned during the course at their own pace.

## **Classroom Decorum**

Attendance will be taken in the first 5 minutes. If a student comes later, his attendance will not be taken. However, he is welcome to attend the class. Students are free to come and go to class as they see fit so long as they do so quietly. If you need to talk to a colleague or on the cell-phone, please excuse yourself from the room to do so and return when you can. Laptops may be used only in the back row of the class so that these devices do not distract anyone sitting behind the laptop user.

The class meetings will be a mix of lectures and class discussions. You should complete the assigned readings in advance of class and come prepared to contribute to class discussions. Regular attendance is required and positive contributions to class are strongly encouraged. Participation in online discussions are also expected.

## **Course Outline**

### **Section I: Derivative Markets and Instruments**

- Types of derivatives
- Derivative markets
- Derivatives and risk hedging

### **Section II: Forward and Futures Contracts**

- Futures markets mechanics
- Types of forward contracts: Equity, bond and interest rate, and currency forward contracts
- Types of future contracts: Stock index, interest rate, commodity, and currency futures contracts
- Determination of forward and futures prices
- Hedging with forwards and futures

### **Section III: Interest Rates, Swap Markets and Contracts**

- Type of interest rates
- Forward rate contracts
- The structure of global swap markets
- Types of swaps
- Valuation of swaps
- Hedging with swaps

### **Section IV: Option Markets and Contracts**

- The structure of global options markets
- Types of options: Financial, futures, and commodity options
- Options versus futures
- Hedging with options

### **Section V: Option Pricing**

- Principles of option pricing

- Binomial trees and trading strategies
- Black-Scholes-Merton option pricing model

### Section VI: Risk Management Applications of Option Strategies

- Option strategies for equity portfolios

#### Required Readings

Hull, John C., Options, Futures, and Other Derivatives. 9<sup>th</sup> Edition, Global Edition, 2018.

Chapters: 1, 2, 3, 4, 5, 7, 10, 11, 12, 13, 15 & 17.

#### Other References (Optional)

- 1) Bodie, Zvi , Alex Kane, and Alan J. Markus, *Investments*, 8<sup>th</sup> Edition, McGraw - Hill, 2009.  
Chapters: 20, 21, 22, & 23; PP.671-822.
- 2) McDonald, Robert L., *Derivatives Markets*, Second Edition, Pearson Addison Wesley, 2006.

#### Course Schedule (Tentative)

Week	Beginning of Week Date	Topic	Required Reading (Hull 10 <sup>th</sup> Edition)	Note
1	06/01/2019 30/04/1440	Introduction	Chapter 1	
2	13/01/2019 07/05/1440	Forward and Futures Contracts	Chapter 2	
3	20/01/2019 14/05/1440	Forward and Futures Contracts	Chapter 3	
4	27/01/2019 21/05/1440	Forward and Futures Contracts	Chapter 5	
5	03/02/2019 28/05/1440	Forward and Futures Contracts Midterm 1 (in class) <b>Wednesday</b> 06/02/2019	Chapter 5	
6	10/02/2019 05/06/1440	Interest Rates	Chapter 4	Up to Section 4.9
7	17/02/2019 12/06/1440	Swap Markets and Contracts	Chapter 7 Omit: Part 7.6	
8	24/02/2019 19/06/1440	Option Markets and Contracts	Chapter 10	
9	03/03/2019 26/06/1440	Option Markets and Contracts	Chapters 11	
10	10/03/2019 03/07/1440	Option Pricing Midterm 2 (in class) <b>Wednesday</b> 13/03/2019	Chapters 12	
11	17/03/2019 10/07/1440	Option Pricing	Chapters 13	
12	24/03/2019 17/07/1440	Option Pricing	Chapters 13,15	
13	31/03/2019 24/07/1440	Option Pricing	Chapter 15	
14	14/04/2019 02/08/1440	Review and Unfinished Business		

### **Academic Integrity**

I expect honesty and integrity from my students. Cheating of any sort will be dealt with as sternly as University policy allows.