

Université Paris II Panthéon ASSAS  
Magistère Banque et Finance, Mastère Banque et Finance  
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MBF1

## INTRODUCTION TO DERIVATIVES

### PROFESSOR

**Nathalie COLUMELLI**, CFA Nathalie graduated from ESSEC and was a fixed income trader for 16 years at ABN Amro, Société Générale and Deutsche Bank in London, Paris, and Frankfurt. In 2005, she founded Finance Training, a leading company specialized in CFA program training for investment professionals. With her team, she mentors financial professionals working for French banks, insurance companies and mutual funds. She was the Executive director of CFA Society France until May 2022 and has been an active volunteer for the association since then.

### PRESENTATION

A derivative is any financial instrument, whose payoffs depend in a direct way on the value of an underlying asset at a time in the future. Derivatives are contracts

- to buy or sell the underlying asset at a future time, with the price, quantity and other specifications defined today
- that give the right to buy or sell the underlying asset at a future time, with the price, quantity and other specifications defined today

This course places emphasis on market operations and the valuations of forward, futures, swaps, and options contracts and their interrelations. Major topics of trading strategies include hedging, arbitrage and speculation, on stock index, interest rate instruments, commodities and foreign currencies.

### KEY CONCEPTS

Reference frame and scope: Capital Markets, Financial analysis departments, and Asset management equity, fixed income, commodities and forex.

Key concepts: Market organization, forwards, futures, options, margins, execution, delivery, pricing, valuation, hedging, arbitrage, speculation & strategy

### LEARNING OBJECTIVES

- At the end of the course, students should be able to do the followings:

**Knowledge:** Students will have an understanding of

- The organization of derivative markets
- The uses and market functions of financial derivatives

- Basic theories on valuations of financial derivatives
- The relationships of financial derivatives with other financial instruments
- The concepts of hedging, arbitrage, and management of financial risks

**Skills:** Students will learn to

- Use various basic financial functions and models in financial calculations
- Use basic statistical and mathematical concepts in developing derivative strategies

**Application abilities:** Students will be able to

- Formulate hedging, arbitrage, and speculative strategies with derivatives
- Apply derivative pricing models to evaluate performances of financial assets and positions
- Compare relative performances of various financial instruments and investment strategies
- Evaluate the major effects of market (in)efficiencies

**Values and Attitudes:** Students will be able to

- Understand the risk of the misuse and/or abuse of financial derivatives
- Understand market failures caused by excessive risk-taking with financial derivatives

## METHOD AND COURSE MATERIAL

Slides are sent to students before the course.

Class preparation is critical to success in this course. As intermediate quizzes are organized, mastering the slides up to latest covered session is critical.

All mentioned Hull chapters (§) in the “course structure” section (below) are not always fully covered for this introductory course.

You are expected to:

- Attend all 7 sessions
- Master the slides and their embedded concepts
- Refer to the referenced chapters on the Hull Options, Futures, and Derivative Securities for further understanding of the course material and cover them fully if you want to deepen your knowledge on the different topics.
- Answer the following list of Hull’s end-of-chapter questions at home (French version):
  - §1, §2, §3, §4, §10: all questions
  - §5: questions 1 to 15
  - §7: questions 1 to 2
  - §11: questions 1 to 20
  - §12: questions 1 to 15
  - §25: questions 2, 12 and 17
  - §29: Question 2

The course is delivered in French & the course material is both in English (slides / Hull) and French (Hull).

## COURSE STRUCTURE

This 21-hour seminar is split in seven 3-hour classes and is taught in March/April.

### FIRST AND SECOND CLASS

#### 1) Session 1 Introduction (Hull, §1 §2)

- a) *Introduction*
  - i) What is a derivative instrument?
  - ii) Market participants
  - iii) OTC and exchange traded derivatives => Post 2008 regulation
- b) *Main derivative products*
  - i) Definitions and terminology

- ii) Forwards commitments
  - (1) Forwards and Futures
  - (2) Interest rate swaps IRS and Currency IRS
- iii) Contingent claims
  - (1) Calls & Puts
  - (2) European/American exercise
  - (3) Credit default Swaps (CDS)
- c) *Uses of derivatives*
  - i) Hedging, Arguments against hedging and Liquidity issues
  - ii) Speculation
  - iii) Arbitrage and Dangers

**2) Session 2 Market & Organization (Hull, §2)**

- a) *Margins*
- b) *Execution: defining best execution, Benchmarks for execution and Types of orders*
- c) *Delivery*

**THIRD AND FOURTH CLASS**

**QUIZZ 1 (30 minutes)**

**3) Session 3 Future & Forwards pricing and P&L (Hull §3 §4 §5 §6)**

- a) *Basis and choice of contract*
- b) *Yield conventions*
- c) *Fundamentals of Futures and Forwards pricing and P&L*
  - i) Equity Future index
  - ii) Bond Future Index
  - iii) FRA and Eurodollar/Euribor contracts
  - iv) Commodity Futures
  - v) Forex

**4) Session 4 introduction to Swaps an Options pricing and P&L (Hull §7 §10 §11 §25 §29 §33)**

- a) *Swaps overview*
  - i) Pricing principles
  - ii) First settlement

**FIFTH AND SIXTH CLASS**

**QUIZZ 2 (30 minutes)**

- b) *Option fundamentals*
  - i) Put/call parity
  - ii) Factors influencing option prices
  - iii) Boundaries for option premiums
  - iv) Payoffs
- c) *Other option-based derivatives*
  - i) CDS fundamentals
  - ii) Caps and floors fundamentals
  - iii) Swaptions fundamentals

**5) Session 5 derivative strategies (Hull §12 §19)**

- a) *Hedge with Equity Futures*
  - i) Optimal hedge ratio using  $\beta$
- b) *Hedge with commodity Futures*
- c) *Hedge with Bond Futures*
  - i) Duration matching and duration-based hedge ratio
  - ii) Limitation of duration-based hedging
- d) *Option strategies: hedging and speculation*
  - i) The Greeks

- (1) Delta Hedging
- (2) Gamma
- (3) Thêta and Rhô
- (4) Vega
- (5) Graphical representation of option portfolio payoffs and of P&L on maturity
- ii) Long synthetic asset
- iii) Covered call
- iv) Protective put
- v) Other classical option strategies

## SEVENTH CLASS

### LAST SLIDES, Q&A AND FINAL EXAM (1.5hours)

## GRADING

A minimum mark of 10/20 on this seminar is required to validate the course.

Final score: 2 intermediate quizzes (weight = 2x20%) and a final exam (weight = 60%)

Exam material: Financial calculator (TIBA2+ preferred). Computers turned off. Printed material allowed (slides and Hull).

If a student misses one or two of the intermediate quizzes, his grade will be calculated as the sum of his other marks.

Please note that it is not possible to get a "make-up" for the final exam, without a very serious reason.

## BIBLIOGRAPHY

### Reference material

- Core reference material
  - Hull, Options, Futures, and Derivative Securities, 10th ed. Pearson
  - French version: Hull Options, Futures et autres actifs dérivés, 9<sup>ème</sup> édition, Pearson
- This course also maps most of the CFA level 1 “Derivatives” body of knowledge as well as some learning objectives of the CFA level 2 and Level 3 “Derivatives” body of knowledge. The reference book is:
  - Don M. Chance and Roberts Brooks, Introduction to derivatives and risk management, 9th ed. South-Western