1. Curricular Unit

Case Studies in Financial Engineering

2. Responsible Faculty Member

João Duque

3. Other Lecturers

Jorge Barros Luís

4. Learning Goals

This curricular unit continues the study of Derivatives markets and products, also covering a wide range of topics on finance and banking.

In the first part, this unit aims to complete the study of the first year course unit "Derivatives" deepening the understanding of some fundamental instruments and techniques that are important when valuing derivatives. A student who successfully completes this curricular unit should:

- Know to estimate the main Greeks of a derivative instrument using different methodologies;
- Identify volatility smiles, suggest volatility smile modelling and alternative valuation models to deal with the smile;
- Estimate volatility and correlation using different methodologies;
- Know the main exotic options and to value them using different methodologies;
- Know how to create, decompose and value a Principal Protected Note and other structured products using different valuation models.

The aim of the second part of this course unit is to get students familiarized with a broad range of issues on financial products and markets, including the understanding of their risks, hedging strategies, valuation, ethical dilemmas and banking management.

5. Outline

1) **Deepening the Study of Derivatives**
   a) The Greek letters
   b) Volatility Smiles and alternative models
   c) Estimating Volatilities and Correlations

    d) Exotic Options
    e) Principal Protected Notes and Other Structured Products

2) Case Studies in Finance
    a) Case Studies #1 to #6

6. Teaching Method

The course is structured into weekly sessions of 3 hours (2 sessions of 1.5 hours each). A first set of 6 sessions covers the subjects of topic "1. Deepening the Study of Derivatives", while the second set of 6 sessions covers the Case Studies.

Evaluation:

A. Regular assessment period

- **Cases Studies presentation and discussion (CS)** (50% of final grade): Each group has to solve one case study, and to present and discuss it during one of the sessions. Excel spreadsheets have to presented when appropriate. A 10-page (maximum) report on the cases presented has also to be submitted by each group afterwards (in 2-weeks time). Each group has also to discuss one of the colleagues' case. Students must organize themselves in groups of three (min) to five students (max). Students must prepare a written report (hard copy), together with an.
- **Final Exam (FE)** (50% of final grade, with a minimum grade of 7/20): The exam is closed book type only with access to a sheet with formulas and equations. This will be provided during the exam.
- **Final Grades (FG):** $FG = 0.5 \; x \; CS + 0.5 \; x \; FE$

B. Repeat assessment period

- **Final Exam** composed by questions about both parts of the course. The exam is closed book type only with access to a sheet with formulas and equations (provided during the exam), unless otherwise stated.
- Repeat Assessment Grade – students may benefit from the grade obtained in the cases presentation and discussion, if the repeat exam grade is below 10 (but in this case with a maximum grade of 10):

$IF(X_1 + X_2) \geq 10$ $FG = X_1 + X_2$

$IF(X_1 + X_2) < 10$ $FG = Min\left(X_1 + \frac{X_2}{2} + \frac{CS}{4}; 10\right)$

         FG = Final Grade

         X_1 = the grade of Part 1 of the Repeat Final Exam (covering the "Deepening the Study of Derivatives")

         X_2 = the grade of Part 2 of the Repeat Final Exam (covering the Case Studies)

         CS = Case Studies

7. Coherence between Teaching Method and Learning Goals

Given that the course has a strong technical component and a global perspective of Financial Products and Markets, students are asked to present solutions to a much diversified problem sets, and also to solve a case study in which they reveal maturity, creativity and analysis of financial products and problems in the real world. The final exam includes problems to solve and also more analytical type of questions based on the readings and reflections of students.

8. Main References

Textbook:
- o Hull, John, Options, Futures and Other Derivatives, 10th edition, Prentice Hall, 2018.

Alternative
- o Willmott, Paul, Derivatives, University Edition, 1998, John Wiley & Sons, Chichester, England, UK.