Asignatura:

**12141 - Financial Mathematics**

Grupo:

I (Internacional)

Curso académico: 2007-08
2º semestre

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1. Objective

The field of Financial Mathematics, or the Mathematics of Finance, describes and analyses financial transactions mathematically.

This introductory 12141 course provides the foundations for the discipline. Specifically, the course concentrates on the basics of a part of the field, sometimes called mathematics of the interest, under the certainty assumption. General topics include: simple and compound interest, discount, financial transactions, the measurement of the return on investment and the cost of credit, and market valuation. Additionally, a detailed analysis of two of the most usual financial transactions, namely loans and bonds, is carried out.

2. Organization

Many of the subjects covered in the course are of a highly practical nature. Accordingly, time will be evenly distributed between theory and practice during the course.

In theory classes, the instructor will introduce, motivate and explain all the topics included in the syllabus. He or she will also illustrate how the theory is applied in reality through many examples as well as real-life problems.

The student is expected to complete the notes taken in class with the required readings, following the teacher’s instructions.

Practical classes will be mainly devoted to problem solving. An active participation of the students in such classes is particularly encouraged, as it will be taken into account in the final grade.

Several problems will also be assigned as homework. Answers will have to be delivered on the required date in order to be considered on the final grade.

3. Exam and Grades

The students will take a written exam at the end of the semester on the officially scheduled date. The exam will include questions and problems regarding both theory and practice.

Final grades will be based (1) on the exam, (2) on classroom participation, and (3) on the homework.

4. Instructors

Cristóbal González
5. Contents

Lesson 1: Fundamentals

1. Financial transactions, interest, and dated values
2. Simple interest and compound interest
3. Simple discount
4. Equations of equivalence

Lesson 2: Theory of compound interest

1. Factors and equations of equivalence
2. Effective and nominal interest rates

Lesson 3: Annuities

2. Basic annuities
3. Varying annuities
4. Annuities payable \( m \)thly

Lesson 4: Financial transactions

1. Financial transactions
2. Equations of equivalence
3. Outstanding balance
4. Measurement of investment return and financing cost: the internal effective rate
5. Additional terms and conditions
6. T.A.E.

Lesson 5: Loans

1. Amortization of a debt
2. Types of loans

Lesson 6: Bonds

1. Introduction and terminology
2. Financial analysis
3. Introduction to bond valuation
4. Basic principles of bond valuation
5. Yield to maturity as a rate of return measure
6. Bibliography

Please note that if a book listed below is available at the library located on campus, its reference is provided [inside brackets].

Recommended Textbooks:

- The required text for the course is:


  This text includes an outline of the theory together with many solved problems.

- Several parts of the course will follow the way theory is presented in the following textbooks, which are recommended as supplementary reading:

  MENEU, V; M.P. JORDÁ y M.T. BARREIRA (1994): *Operaciones financieras en el mercado español*. Ariel Economía, Barcelona. [S 330.4 MEN; CE 51 MEN]

  This textbook in Spanish is recommended as supplementary material for lessons 4 to 6.


  This reference is recommended as supplementary reading for the second part of lesson 6.

Other textbooks:

- The student might also find the following books helpful.


  This textbook introduces the fundamental concepts, terminology and notation used in the book by Meneu, Jordá and Barreira.


  This book is used by the Society of Actuaries as a syllabus reference on the mathematics of compound interest. In addition to an advanced coverage of the fundamental topics studied in the course, this book introduces the reader to many practical applications.


  This is one of many textbooks covering miscellaneous topics on the mathematics of business. It might be useful for those Spanish students interested in learning basic mathematical concepts in English used in the financial world.

A classic, this textbook is out of print. It contains more formal and advanced presentation of the topics studied in the course.


This textbook in Spanish follows very closely the structure and the topics included in the required text in English.


This out of print text is basically an unabridged hardback edition of the required text. (There exist other later editions, but they are not available at the library on campus.)
Mathematical finance, also known as quantitative finance and financial mathematics, is a field of applied mathematics, concerned with mathematical modeling of financial markets. Generally, mathematical finance will derive and extend the mathematical or numerical models without necessarily establishing a link to financial theory, taking observed market prices as input. Mathematical consistency is required, not compatibility with economic theory. Thus, for example, while a financial economist might MIT mathematicians teach the mathematics part while industry professionals give the lectures on applications in finance.