Stochastic models in finance and insurance

Academic Year: (2022 / 2023) **Review date: 13-05-2022**

Department assigned to the subject: Statistics Department

Coordinating teacher: GRANE CHAVEZ, AUREA

Type: Electives ECTS Credits : 6.0

Year : Semester :

OBJECTIVES

The central aim of this subject is to understand the basic principles, tools and applications of Statistics needed for risk analysis in Finances and Actuarial Sciences.

SPECIFIC KNOWLEDGE COMPETENCES:

After successfully finishing the course, the student will be able:
-To understand and to apply Terchnical Statistical Analysis to study the stock market
-To understand Warrant's chacarcteristics and behavior.
-To learn the basic actuarial notions
-To run the calculus of a car insurance rate and the value of technical provisions.

ADDITIONAL COMPETENCES:

Skills:
-Capacity to analyze and syntesize real situations by means of quantitative models
-Logical and relational abilities

Attitudes:
-To offer quantitative solutions to complex problems
-The use of mathematical language and techniques to give a formal description of problems.

DESCRIPTION OF CONTENTS: PROGRAMME

PART I: STATISTICAL METHODS FOR FINANCE

1. Technical and graphical stock-market analysis
   1.1 Introduction
   1.2 Dow Theory
   1.3 Graphics
   1.4 Trends
   1.5 Stock-market chart formations
2. Statistical tools for the technical analysis
   2.1 Moving averages
   2.2 Technical indicators and oscillators
3. Warrants
   3.1 Derivatives
   3.2 Warrants: definition
   3.3 Warrants: characteristics
   3.4 Warrants: the price
   3.5 Variables affecting the time value
   3.6 Greeks
   3.7 Tools for warrant analysis
   3.8 Selection of a warrant: the underlying asset
   3.9 Selection of a warrant: the expiration date

3.10 Selection of a warrant: the strike
3.11 Delta sensitivity relation

PART II: STATISTICAL METHODS FOR INSURANCE

4. Insurance preliminary definitions
4.1 Management basics
4.2 Elements of an Insurance contract
4.3 Insurance types
5. Non-life insurance
5.1 Frequency distribution and average cost
5.2 Risk factors
5.3 Parameters and methodology
6. Life Insurance
6.1 Types
6.2 Mortality tables
6.3 Generational mortality tables: projection methods
7. Provisions
7.1 Classification
7.2 Statistical methods for provisions calculation
7.3 Determining technical provisions: Grossing up, Link Ratio and Chain-Ladder

LEARNING ACTIVITIES AND METHODOLOGY

Tutorial classes are scheduled for 15th week.

ASSESSMENT SYSTEM

% end-of-term-examination:	60
% of continuous assessment (assigments, laboratory, practicals…):	40

60% of the final mark will be obtained by means of a final exam that tests the required knowledge. The final exam consists of two parts, theory and practice. A minimum of 4 points is required in each part of the final exam. The remaining 40% will result from the presentation of 5 case studies (20%). Optionally, an examination about these case studies can be done.

100% of the final mark will be obtained by means of the final June exam.

BASIC BIBLIOGRAPHY

- Andrew M. Chisholm Derivatives Demystified, John Wiley & Sons, 2011

- Barry C. Arnold, N. Balakrishnan, Jose-Maria Sarabia Alegria Advances in Mathematical and Statistical Modeling, Biometrics, 2009

- Dale S. Borowiak, ¿Arnold F. Shapiro Financial and Actuarial Statistics: An Introduction, CRC Press, 2013

- Erik Barker Indicators and Oscillators in Excel, Borsa e Mercati, 2013

- Pavel Cizek, Wolfgang Karl Härdle, Weron Statistical Tools for Finance and Insurance, Springer Science & Business Media B.V. / Books, 2011

ADDITIONAL BIBLIOGRAPHY

- Gil Fana, J.A., Heras Martínez, A. y Vilar Zanón. Matemática de los seguros de vida., Mapfre, 1999..

- Latorre Llorens, L. Teoría del Riesgo y sus Aplicaciones a la Empresa Aseguradora., Mapfre, 1992..

- Lozano Aragües, R. Análisis práctico de la normativa patrimonial de las entidades aseguradoras., CES (Centro de Estudios del Seguro), 1999..

- Marín, J.M. y Rubio, G. Economía Financiera., Antoni Bosch, 2001..

- Meneu, V., Jorda, M.P. y Barreira, T. Operaciones financieras en el mercado español., Ariel, 1994..

- Nieto de Alba, U. y Vegas Asensio, J. Matemática Actuarial., Mapfre, 1993..

- Peña, D. Fundamentos de Estadística., Alianza Universidad Textos, 2008..