Statistical methods for finance and insurance

Academic Year: (2023 / 2024)   **Review date: 20-04-2023**

Department assigned to the subject: Statistics Department

Coordinating teacher: GRANE CHAVEZ, AUREA

Type: Electives ECTS Credits : 6.0

Year : 4 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.

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.

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

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.

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

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..