



UNIVERSITÀ
CATTOLICA
del Sacro Cuore

Actuarial life insurance

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Course aims and intended learning outcomes

The course aims to introduce students to technical topics related to the offer of innovative life insurance products, through the usage of basic notions of actuarial mathematics. The course aims to provide students with methodological and applicative mastery to assess life insurance portfolios and to determine capital requirements for solvency purposes in consideration of current regulations.

Course content

Analytical course content with detailed learning objectives:

1. Modeling the Lifetime for life actuarial maths: From the Basic Model to More General Models: heterogeneity factors and rating factors. Classification and risk selection in insurance. Sub-Standard risk mortality models. The mortality tables: aggregated, select and ultimate tables. Mortality Dynamics: trends and projection. The mortality projection models: the basic models and the Lee-Carter model.
2. Life Insurance: from traditional to participating policies. With-profits policy. The participating account and the participating rules for policies in ramo I. Participating policies with a minimum guaranteed.
3. Unit and Index Linked Insurance. Linked policies with and without guarantees. An introduction to financial options: the Cox, Ross & Rubinstein model. The Black & Scholes Formula. Risk Neutral Approach vs. Real World: deflators, state price and risk premium. Structured notes. The Brennan & Schwartz model.
4. Valuation of a life insurance portfolio: From the 'actuarial value' to the 'value creation'. The analysis of cash flows and earnings: some relationship. The expected profit breakdown: financial income and technical margins. Profitability analysis: profit test. The assessment model based on capital.
5. Solvency II project
6. for life insurance: The Solvency II Directive, delegated acts and technical specifications. Best estimate of technical provisions. An analysis of Market, Health and Life risk modules for the assessment of the Solvency Capital Requirement.

Reading list

Compulsory reading:

- OLIVIERI-E. PITACCO, Introduction to Insurance Mathematics: Technical and Financial Features of Risk Transfers, 2° edition Springer-Verlag Berlin Heidelberg, 2011.
T. BJÖRK, Arbitrage Theory in Continuous Time, Third Edition, Oxford Finance Series, 2009. Chapter 2 and 3.
A. OLIVIERI-E. PITACCO, La valutazione nelle assicurazioni vita, EGEA, 2005.

Recommended reading:

- E. PITACCO, Matematica e tecnica attuariale delle assicurazioni sulla durata di vita, Ed. Lint, Trieste, 2002.
J.C. HULL, Options, futures, & other derivatives, Prentice Hall.
E. PITACCO-M. DENUIT-S. HABERMAN-A. OLIVIERI, Modelling longevity dynamics for pensions and annuity business, Oxford University Press, 2009.



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Teaching method

Lectures and guided practical work.

Assessment method and criteria

Written or Oral exam on theory and practical work.