UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Quantitative Methods for Insurance

2223-2-F1601M065

Learning objectives

The course is divided into the modules of Actuarial Mathematics (5 CFU, second term, related to Life Insurance) in the secon term and Statistics for Insurance (3CFU, first term, related to Non-Life Insurance).

We believe that studying these issues both from the mathematical and the statistical point of view better clarifies the basic notions required to become an actuary.

The main learning objectives may be divided as follows:

ACTUARIAL MATHEMATICS

- the student should understand the general problem of premium principles, relating it with the theory of financial option pricing, with expected utility theory and with the theory of risk measures

- the student should know the basic traditional models for the duration of the human life and should be able to compute related quantities

- the student should be able to compute the actuarial value of standard life contracts

- the student should be able to understand the dynamic of the mathematical reserve either in a traditional 'best-estimate' approach, or in a stochastic approach

- the student should be able to recognize and price optionality elements in life insurance policies.

STATISTICS FOR INSURANCE:

Understanding pricing methodologies of insurance contracts, based on statistical modelling, and the role of the reserves.

Contents

ACTUARIAL MATHEMATICS:

Premium principles (indifference premium, exponential premium, Esscher premium, axiomatic theory of premium principles, distorted risk measures).
Modeling the duration of human life (life and death probabilities, mortality tables, mortality force, deterministic laws, stochastic mortality).
Classical actuarial mathematics (actuarial present values, premium calculation, mathematical reserve, recursive formulas, risk premium and saving premium, decomposition of the profit).
Options and insurance contracts (implicit options, participating policies, unit linked, index linked, mortality derivatives). Introduction to Solvency II.

STATISTICS FOR INSURANCE:

After a first introductory part, aimed at the creation of a common base among students with different background, the course deals mainly with two topics of great practical importance in Non-Life Insurance companies, that are the computation of personalized premia (e.g. by Generalized Linear Models) and the various models and methodologies for the assessment of the reserve.

Detailed program

We refer to the syllabus of the two modules.

Prerequisites

We refer to the syllabus of the two modules.

Teaching methods

We refer to the syllabus of the two modules.

Assessment methods

In order to pass the exam it is necessary to pass the exams of both modules.

The final grade is the weighted average, with respect to credits, of the grades of the two modules.

For the assessment methods of each module we refer to the corresponding syllabus.

Textbooks and Reading Materials

We refer to the syllabus of the two modules.

Semester

Statistics for Insurance - First semester
Actuarial Mathematics - Second semester

Teaching language

English

Sustainable Development Goals

INDUSTRY, INNOVATION AND INFRASTRUCTURE