# Actuarial models for social security and pension funds

## Prof. Gian Paolo Clemente

***COURSE AIMS AND INTENDED LEARNING OUTCOMES***

Aim of the course is to provide a knowledge about actuarial techniques for the evaluation of public pension-schemes and pension funds.

The following topics will be tackled: the structure of the Italian public and complementary pension systems, the development of regulations and main reforms of the public pension-scheme, the financial systems for managing the public pensions, the determination of premiums and actuarial reserves within the framework of an IVS system (disability, retirement and survivor), the methods for computing contributions and benefits for a defined benefit pension fund.

The course contemplates lectures as well as seminars involving experts so as to illustrate some of the issues linked to the management of the public pension and pension funds.

By the end of the course, students should be able to compute pension benefits and contribution levels for an IVS system and a defined benefit pension plan.

***COURSE CONTENT***

*Course outline and detailed learning goals*

*1. General information about pensions*

In this section we deal with the following topics:

– understand and know the concept of pensions;

– know which risks are covered by public pensions schemes and which kind of benefits are provided;

– understand Italy's three-pillar pension system.

*2. The Italian pension system*

In this section we deal with the following topics:

– understand the Italian pension system;

– know the main reforms made to the Italian pension system in recent years;

– be able to compare different financial management systems;

– understand the impact of the different reforms and any individual initiative on the balance of a financial system.

*3. Basic public pensions (disability, retirement and survivor)*

In this section we deal with the following topics:

– choose appropriate technical bases for the determination of the premium in an IVS system;

– calculate the estimated present value of the benefits and wages related to a group pension plan with specific characteristics;

– understand and calculate capitalisation coefficients;

– determine the contributions for a hypothetical IVS system for different financial management systems;

– determine the actuarial reserves of an IVS system for different financial management systems;

– evaluate the equilibrium of a financial system for a specific accounting year;

– evaluate the relationships between the capitalisation coefficients and the transformation coefficients introduced by the Dini reform.

*4. Complementary pension system*

In this section we deal with the following topics:

– understand current legislation about pension funds;

– compare Italian complementary pension system to European framework;

– understand the financial management methods for pension funds;

– compare defined-contribution and defined-benefit plans.

*5. Actuarial models for defined-benefit pension plans with individual capitalisation*

In this section we deal with the following topics:

– understand a defined-benefit plan;

– evaluate benefits and contributions;

– use different actuarial funding methods for computing contributions;

– evaluate the level of equilibrium of a pension fund in static and dynamic conditions.

*6. Some comments about actuarial models for health insurance*

In this section we deal with the following topics:

– provide some comments about the methodology used for pricing health insurance

***READING LIST***

Given the particular structure of the course and the analysis of certain topics over a long term horizon, it is not possible to identify specific textbooks that cover all course topics.

Instructional material will be made available on the Blackboard platform throughout the course.

Reading materials for further study (optional)

A. Tomasetti et alii, *Tecnica attuariale per collettività,* Kappa, Rome, 1995, vol. I.

N. Savelli, *Modelli attuariali per schemi pensionistici a prestazioni definite con capitalizzazione individuale,* Kappa, Rome, 1984.

# E. Pitacco, *Health Insurance: Basic Actuarial Models*, 2014

***TEACHING METHOD***

Lectures, supplemented by presentations by experts in the pension business.

***ASSESSMENT METHODS AND CRITERIA***

The exam is based on two written examinations. The first written examination is based on practical exercises and will be done using the excel software.

The second written exam is based on theoretical question.

The final mark is the simple average of grades of the two exams. To pass the exam the student must have a mark greater than 18 in both parts.

In case the exam has been failed, both parts must be taken again.

The examination regards the entire course syllabus. The examination is aimed at assessing reasoning, analytical rigour with regard to course topics.

***NOTES AND PREREQUISITES***

*Prerequisites*

Before entering the course, the student should have a basic knowledge of demographics and financial concepts, be able to evaluate premium and technical provisions for life insurance policies, have a knowledge of actuarial methods for annuity contracts.

 *Office hours*

Further information can be found on the lecturer's webpage at http://docenti.unicatt.it/web/searchByName.do?language=ENG, or on the Faculty notice board.