Course unit: Actuarial science

Course metadata

- Title in French: Actuariat
- Course code: tba
- ECTS credits: 3
- Teaching hours: 72h
- Type: specialized course
- Language of instruction: English
- Coordinator: Renaud Bourlès
- Instructor(s): Mitra Fouladirad, Alexis Louass (Ecole Polytechnique-Institut Polytechnique de Paris), Arnaud Goussebaïle (ETH Zürich) Xavier Guerrault (AXA), Renaud Mouyrin (AXA), Matthias Servel (AXA), Corinne Cherki (AXA), Alban Davand (AXA), Carelle Merlo (AXA, Emmanuelle Mimart (AXA), Sofiane Ournidi (AXA), Yannick Ropert (AXA)
- *Last update 27/08/2021 by C. Pouet*

Course description

The aim of the course is to present the main issues related to pricing of insurance products as well as the recent developments in actuarial sciences related to prudential regulation, disability insurance or long-term care.

This course unit is divided into three parts:

- **Economics of insurance** (24 hours) taught by Alexis Louass and Arnaud Goussebaïle.
- **Actuarial science 1** (24 hours) taught by Mitra Fouladirad, Xavier Guerrault, Renaud Mouyrin, Matthias Servel.
- **Actuarial science 2** (24 hours) taught by Xavier Guerrault, Corinne Cherki, Alban Davand, Carelle Merlo, Emmanuelle Mimart, Sofiane Ournidi, Yannick Ropert.

Learning outcomes

- Understand how individual behaviors aggregate in the insurance market and how prices form
- Know the principles driving the pricing of insurance products and be able to apply it to simple products
- Understand the need of provisioning and know the basic model to compute provisions
- Know the current regulation and its impact on insurance pricing and provisioning
- Know how to value an insurance portfolio

Course content

Economics of insurance

1. Introduction: Risk attitude and preferences
2. The single risk model

3. Product differentiation
4. Unobservable criteria
5. Moral hazard
6. Extensions and exercises
7. Topic: Duration models and life tables

Actuarial science 1

1. Introduction to actuarial science
    - Life insurance model: fair premiums and prudent pricing
    - Non-life specificities: provisioning and variability of non-life risks
2. Life Insurance, saving products, and accounting
    - Introduction on Mathematical Reserves
    - Saving contracts and performance distribution mechanisms
    - Performance indicators for an insurance company
3. Non-Life Insurance
    - Mechanisms of Non-Life Insurance
    - Loss experience and reserving
    - Introduction to Non-Life Reinsurance

Actuarial science 2

1. Valuing an insurance portfolio
2. Asset-liability management in insurance
3. Accounting and financial communication of insurance companies
4. The current regulation: IFRS17
5. CAT risk and CAT reinsurance
6. Focus on long-term care

Bibliography

Check the availability of the books below at Centrale Méditerranée library.

1. Economics of insurance
    - course handout
    - Picard, P., Economic Analysis of Insurance Fraud. Handbook of Insurance.
    - Schlessinger, H., The Theory of Insurance Demand. Handbook of Insurance.
2. Actuarial science 1 and 2
    - Charpentier A. (ed.), Computational Actuarial Science with R, Chapman and Hall/CRC.
    - Tosetti A., Weiss F. et Poncelin T., Les outils de l'actuariat vie, Economica .