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**CORE SYLLABUS**  
**FOR**  
**ACTUARIAL TRAINING IN EUROPE**

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# ACTUARIAL ASSOCIATION OF EUROPE SYLLABUSES A CORE SYLLABUS FOR ACTUARIAL TRAINING IN EUROPE

## PART ONE: GUIDELINES FOR THE SYLLABUS

### Introduction

1. The core syllabus for actuarial training in Europe is presented in Part Two of this document. In this section guidelines to the use of the syllabus are presented.

### Purpose of Syllabus

2. This syllabus is intended to underpin the mutual recognition agreement and the statutes of Actuarial Association of Europe (AAE).
3. The core syllabus will also provide a tool to aid associations in reviewing their own syllabuses. All associations will wish to implement it in their own way.
4. The core syllabus will provide a tool to new associations wishing to develop a syllabus.
5. It is the responsibility of member associations to ensure that those admitted to the level of membership relevant for mutual recognition have successfully completed all aspects of the core syllabus.

### Syllabus Presentation

6. The syllabus has been prepared as four stages:

#### Generic Technical Subjects

Included in this stage are subjects that are not unique to actuarial science but are essential background for study in this area. The subjects need not be covered individually but could be integrated with other subjects.

#### Actuarial Technical Subjects

Included in this stage are subjects that form the fundamental tools for actuarial science and finance.

#### Actuarial Applications

Included in this stage are subjects in which the principles and practice of actuarial techniques are developed in a variety of applications areas. The purpose at this stage is to provide a generalised framework for actuarial risk management for varying types of risk. The subjects need not be covered individually but the actuarial concepts are important with examples to demonstrate different approaches depending on the different nature of risk.

#### Specialisation

Included in this stage are subjects and items which are needed for an actuary in order to be a specialist within a certain country or certain area of actuarial work and risk management. Each actuary is expected to have studied to the appropriate level in at least one specialism.

Student actuaries will need to study the regulatory, legislative, cultural and administrative framework of the EU and the country in which they intend to work.

7. Within each stage topics have been presented under a number of subject headings. This grouping has been done to aid comprehension and assimilation. The subjects should not necessarily be considered to be of equal weight. It is anticipated that each education provider will choose to regroup the topics in ways that are deemed to be appropriate for each particular environment and method of syllabus delivery.
8. The subjects, particularly the Generic Technical subjects, contain many topics that might be covered before starting the formal actuarial education. Again there will be differences between education providers in this respect. It is not important at which stage topics are covered, only that students gain proficiency in them and that they are reflected in the membership entry requirements of the individual associations.
9. It is not necessary for all topics in the General Skills to be directly assessed during formal actuarial education. They might be assessed indirectly, as commented on some subjects. As one example, language skills could be assessed through the use of teaching material in different languages, rather than through language exams
10. Education providers may well regroup topics presented here in different stages to be covered within a subject which covers more than one stage. Thus in some education programmes the mathematical background and practical consideration of particular topics may be covered together. The order in which subjects and topics are covered will also be the decision of each education programme.
11. It is recognised that in different countries actuarial education may be offered through universities, through the professional association or through a combination of both. The balance between more theoretical and more practical considerations will vary under different systems. Emphasis will also vary between countries.
12. Student actuaries need to develop higher order skills of analysis, synthesis and judgement. This may be achieved through different forms of study and assessment such as a dissertation or through practical work experience.
13. This syllabus concentrates on content of courses and does not deal with learning approaches or assessment methods.
14. Post-qualification training will be necessary to ensure that actuaries are up-to-date with changes in the framework for their practice area. Continuing Professional Development (CPD) schemes will be helpful in this respect. Associations are recommended to have a CPD policy and to support its members with CPD activities.

### **Syllabus Themes for the Training of Actuaries**

15. In the training of actuaries it is important that actuaries understand the principles of modelling with the practical considerations for the use of models. This theme will be encouraged where appropriate in all syllabuses.
16. Through the generalised applications stage students are encouraged to understand the principles of actuarial risk management. Actuaries are increasingly working with new products covering new types of risk and for this reason students are encouraged to consider wider types of risk than the ones in which they are currently practising.
17. It is important that student actuaries are aware of the business environment in which they will be working.

### **Syllabus Development**

18. There is a commitment to keep this syllabus under review and to update it as appropriate on a regular basis. It is important that the syllabus does not become obsolete over time and prepares actuaries to work in the context of current European legislation
19. It is the intention that all aspects of the IAA Core Syllabus are covered by the Core Syllabus of AAE and in addition knowledge of a particular area of practice in the relevant country.

### **Mutual Recognition**

20. Within the AAE there is a mutual recognition agreement for fully qualified actuaries and the purpose of this syllabus is to develop as far as the Actuarial Applications stage a harmonisation of syllabuses throughout member countries.
21. The Core Syllabus should be consistent with the AAE's Mutual Recognition Agreement regarding practical experience.

## **PART TWO: AAE SYLLABUSES**

### **GENERAL SKILLS**

#### **1. Computing**

**Aim:** To provide a grounding in modern computing methods necessary for the work of an Actuary.

The student is expected to have a working knowledge of modern information communication and technology (ICT) as appropriate for the work of an actuary.

A formal assessment of this part is not necessary.

#### **2. Regulation and Legislation and Taxation**

**Aim:** To give students an appreciation of the structures and legislative instruments of the EU. This part is recommended as part of a European qualification.

- (a) Purpose of international structures
- (b) Understanding variations in country cultures
- (c) Structures within the EU
- (d) Relevant EU legislation

A formal assessment of this part is not necessary.

#### **3. Communication Skills**

**Aim:** To develop the ability to present actuarial ideas and arguments both on paper and orally in a manner which will enable them to be understood by non-actuaries.

**Objectives:**

- (a) The student would be expected to be able to draft a written communication intended to be read by a lay person to a standard where the draft would:
  - be acceptable as a final document without major changes or rewriting, though a moderate number of more minor changes might still be required (a standard which might be appropriate for a newly qualified actuary, rather than a specialist experienced actuary),
  - convey the major concepts and contain no major mis-statements of fact or omissions or unsupported opinion.
- (b) The student would also be expected to be able to make an oral presentation on a technical subject to a lay person.

A formal assessment of this part is not necessary.

#### **4. Language Skills**

**Aim:** To enable students to communicate in business discussions and to read actuarial literature in at least two of the languages of the countries within the EU. This part would not be compulsory but is recommended as part of a European qualification.

A formal assessment of this part is not necessary.

## **GENERIC TECHNICAL SUBJECTS**

The subjects at this stage are:

1. Mathematics
2. Probability and Statistics
3. Stochastic Processes and Modelling
4. Economics
5. Accounting and Financial Reports

Actuarial students may have studied many of these topics before starting formal actuarial education. In the others, assessment may have been at earlier stages of education.

### **1. Mathematics**

**Aim:** To provide a grounding in relevant mathematics.

- (a) Mathematical analysis
- (b) Linear algebra
- (c) Numerical analysis
- (d) Stochastic calculus

### **2. Probability and Mathematical Statistics**

**Aim:** To provide a grounding in relevant probability and mathematical statistics.

- (a) Theory of probability and mathematical statistics
- (b) Decision theory
- (c) Data analysis
- (d) Regression analysis

### **3. Stochastic Processes and Modelling**

**Aim:** To provide a grounding in stochastic processes and modelling methodology.

- (a) Principles and methods of modelling
- (b) Stochastic processes for insurance and finance
- (c) Time series modelling
- (d) Simulation methods

### **4. Economics**

**Aim:** To provide a grounding in the fundamental concepts of economics as they affect the operation of insurance and other financial systems.

- (a) Macroeconomics
- (b) Microeconomics

### **5. Accounting and Financial Reports**

**Aim:** To provide a grounding in understanding and interpreting the accounts and financial statements of companies and financial institutions.

- (a) Accounting principles
- (b) Financial structures of business entities
- (c) Basic structure of company accounts
- (d) Interpretation of business accounts

## **6. Legislation**

**Aim:** To provide a grounding, understanding and application of the legislation that applies to financial institutions.

- (a) Supervisory legislation
- (b) Financial services laws

## **ACTUARIAL TECHNICAL SUBJECTS**

The subjects at this stage are:

7. Financial Mathematics
8. Multiple State Modelling
9. Contingencies
10. Risk Mathematics
11. Finance and Financial Markets
12. Quantitative Risk Management and Solvency

### **7. Financial Mathematics**

**Aim:** To provide a grounding in financial mathematics and their applications to actuarial science.

- (a) Theory of deterministic interest
- (b) Introduction to contingent claims analysis
- (c) Stochastic calculus for finance
- (d) Theory of stochastic interest
- (e) Asset management

### **8. Multiple State Modelling**

**Aim:** To provide a grounding in multiple state modelling

- (a) Survival models and parameter estimation
- (b) Multiple state models and parameter estimation
- (c) Construction of a decrement table
- (d) Population characteristics and risk classification

### **9. Contingencies**

**Aim:** To provide a grounding in the mathematical techniques, including stochastic techniques, which are of relevance to actuarial work.

- (a) Reserving methodology
- (b) Pricing of long term and short term insurance products
- (c) Valuation techniques
- (d) Analysis of changes in technical results

### **10. Risk Mathematics**

**Aim:** To provide a grounding in risk mathematics and its use in actuarial work.

- (a) Distribution of frequency and severity of claims
- (b) Risk theory
- (c) Credibility theory
- (d) Dependencies
- (e) Generalised linear models

### **11. Finance and financial markets**

**Aim:** To provide a grounding in finance, investment and portfolio theory.

- (a) Financial markets
- (b) Pricing and valuation of financial products
- (c) Corporate finance

- (d) Portfolio theory
- (e) Economic value and measurement

## **12. Quantitative Risk Management and Solvency**

**Aim:** To provide a grounding in the quantitative aspects of risk management

- (a) Risk classification
- (b) Measuring risk
- (c) Diversification
- (d) Dynamic financial analysis and internal models
- (e) Capital requirements

## **ACTUARIAL APPLICATIONS**

### **Introduction:**

The subjects at this stage are:

- 13. Actuarial Enterprise Risk Management
- 14. Professionalism

### **13. Actuarial Enterprise Risk Management**

#### **Aim:**

To provide the technical skills to apply the principles and methodologies studied under actuarial technical subjects for the identification, quantification and management of risks.

#### **Topics:**

- The general operating environment of the enterprise
- Assessment of risks; risk types and risk measures
- Design and pricing of products and/or services
- Determination of assumptions and scenario setting
- Reserving and valuation of liabilities
- Risk mitigation
- Asset Liability Management
- Monitoring the experience and exposure to risk
- Solvency and profitability of the enterprise and the management of capital

### **14. Professionalism**

#### **Aim:**

To develop an awareness of the meaning of professionalism, the importance of professionalism in the work of an actuary and some of the professionalism issues which may arise in the course of that work.

#### **Topics:**

- Conduct standards and discipline
- Professional Standards
- Professionalism and business ethics

## **SPECIALISATION**

Candidates will be required to study at least one of the applications areas in greater depth to gain the full qualification for their association. In this stage student actuaries should demonstrate the ability to develop higher order skills of analysis, synthesis and judgement.

Possible areas of specialisation:

- Life
- Pensions
- General insurance
- ERM
- Investments
- Health care
- Banking
- Social security
- Reinsurance

Where there is relevant European Union and country specific legislation, student actuaries must acquire a fuller understanding of that legislation over the knowledge acquired in section 6 (Legislation).

The specialisation could be one or more of

- (a) Deeper studies
- (b) Studies of European and country specific topics
- (c) Research
- (d) Practical application of principles