



# 2007 IAA Education Syllabus

This version was approved at the Council meeting on 18 April 2007 and replaces the 1998 document.

## 1. Financial Mathematics

### **Aim:**

To provide a grounding in the techniques of financial mathematics and their applications.

### **Topics:**

- Deterministic theory of interest rates
- Generalised cash-flow models
- Introduction to contingent claims analysis
- Term structure models
- Risk neutral valuation, including derivative pricing and deflators
- Stochastic calculus for finance
- Stochastic theory of interest
- Dynamic portfolio management
- Introductory applications to insurance and other financial liabilities

## 2. Probability and Mathematical Statistics

### **Aim:**

To provide a grounding in probability and mathematical statistics.

### **Topics:**

- Concepts of probability
- Random variables and their characteristics
- Methods and properties of estimation
- Correlation and regression analysis
- Hypothesis testing and confidence intervals
- Data analysis

- ### 3. Economics

**Aim:**

To provide a grounding in the fundamental concepts of both microeconomics and macroeconomics.

**Topics:**

- Microeconomics
- Macroeconomics

### 4. Accounting

**Aim:**

To provide the ability to interpret the accounts and financial statement of companies.

**Topics:**

- Basic principles of accounting
- The role of accounting standards
- Different types of business entity
- Basic structure of company accounts
- Interpretation and limitation of company accounts

### 5. Modelling

**Aim:**

To provide an understanding of the principles of modelling and its applications.

**Topics:**

- Model structures
- Selection process
- Calibration
- Validation
- Scenario setting
- Sensitivity testing
- Limitations
- Computer applications of modelling
- Documentation and audit trail

## 6. Statistical Methods

### **Aims:**

To provide the skills and expertise in the use of statistical methods for the understanding of risk in a range of actuarial work.

### **Topics:**

- Statistical models, such as regression and time series
- Survival and multi-state models
- Risk models (individual and collective)
- Parametric and non parametric analysis of data
- Graduation principles and techniques
- Estimation of frequency, severity and survival distributions
- Credibility theory
- Ruin theory
- Concepts of stochastic processes
- Simulation methods

## 7. Actuarial Mathematics

### **Aim:**

To provide the skills and expertise in the application of the mathematics of contingent payments to common problems in actuarial practice.

### **Topics:**

- Nature of the events giving rise to a contingency
- Typical solutions offered by insurance, social insurance, other financial services, or risk management e.g. products, schemes, contracts or transactions that will provide payments or benefits on future financial events in relation to:
  - The risk profile and aims of the parties involved
  - The concepts of risk avoidance, risk transfer and risk retention
  - The level and form of cash flows to be provided
  - Any options or guarantees that may be included
  - The method of financing the cash flows to be provided
  - The choice of assets when payments or benefits are funded
  - The charges that will be levied
  - The capital requirements
- Actuarial methods for evaluating the prospective cost of solutions, e.g.:
  - Pricing of insurance contracts
  - Financing methods for other products or plans
  - Financial effects of other risk management solutions
- Actuarial methods for monitoring the results and maintaining financial stability, such as:
  - Reserving
  - Financial Reporting
  - Reinsuring
  - Profitability analysis
  - Financial condition analysis

## 8. Investment and Asset Analysis

### **Aim:**

To develop the ability to apply actuarial principles to the valuation, appraisal, selection and management of investments and to liaise with other investment professionals.

### **Topics:**

- The objectives of institutional and individual investors
- Types of investment (bonds, shares, property and derivatives)
- Valuation of investments
- Portfolio selection - incorporating assessment of relative value
- Performance measurement
- Portfolio management
- Management of investments with respect to liabilities using techniques such as immunisation, asset-liability management and liability driven investment.

## 9. Actuarial Risk Management

### **Aim:**

To develop the ability to apply the principles of actuarial planning and control needed for the identification and quantification and management of risks for the operation of risk related programs on a sound financial basis.

### **Topics:**

- The general operating environment of the enterprise
- Assessment of risks; risk types and risk measures
- Design and development of products and/or services
- Pricing of products and services and assumptions underlying the pricing
- Reserving and valuation of liabilities
- Management of risks and methods of reducing risk exposure, such as reinsurance
- Management of the relationships between assets and liabilities
- Monitoring the experience and exposure to risk
- Solvency and profitability of the enterprise and the management of capital
- Principles of regulation of financial institutions

## 10. Professionalism

### **Aim:**

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

### **Topics:**

- Characteristics and standards of a profession including the need for:
  - Specialised skill and education
  - Ongoing training and development
  - High quality of advice
  - Exercise of independent judgement
  - Objectivity, integrity and accountability
- Code of conduct
- Discipline process
- Practice standards set by actuarial bodies and other stakeholders
- Regulatory roles of actuaries
- The professional role of the actuary
  - Analysis and resolution of ethical issues
  - Identifying and managing conflicts, misuse of or undue influence on advice
  - Nature of advice
  - The public interest