

# ***IAA Education Syllabus***

## **1. FINANCIAL MATHEMATICS**

### **Aim:**

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

### **Topics:**

- Introduction to asset types and securities markets
- Interest, yield and other financial calculations
- Investment risk, introduction to stochastic interest and discount
- Market models - e.g. term structure of interest rates and cash flow models

### **Indicative Reading:**

Core Reading (Subject A1 - Subject 102)  
Faculty and Institute of Actuaries

Mathematics of Finance  
J J McCutcheon and W F Scott

## **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

### **Indicative Reading:**

Mathematical Statistics  
John E Freund, Prentice Hall, International Editions

Subject C1 Core Reading/Subject 101 Core Reading  
Faculty and Institute of Actuaries

## **3. ECONOMICS**

### **Aim:**

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

### **Topics:**

- Microeconomics
- Macroeconomics

**Indicative Reading:**

Core Reading for Subject 107  
Faculty and Institute of Actuaries

There are many suitable textbooks at an introductory undergraduate level although most will have a fairly strong national bias.

Economics  
Begg, Fischer and Dornbusch, published by McGraw-Hill, would be suitable for the UK.

**4. ACCOUNTING****Aim:**

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

**Topics:**

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

**Indicative Reading:**

Accounting texts tend to be too detailed and country specific, although the very introductory parts of standard accounting courses may be suitable. Other suitable texts are likely to be written for general management studies rather than for accountants. On the analysis of accounts, most books written for investment analysts are likely to contain too much industry and country detail. A treatment at a suitable level is provided, for example, in the chapter "Analysing Financial Performance" in Principles of Corporate Finance, by Brealey and Myers, published by McGraw-Hill.

Other suitable texts might be the training manual for the Investment Management Certificate of the Institute for Investment Management and Research (IIMR) and the Core Reading for Subject 108, Faculty and Institute of Actuaries.

**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

**Indicative Reading:**

Core Reading (Subject 103)  
Faculty and Institute of Actuaries

Introduction to Actuarial Modelling  
James C Hickman North American Actuarial Journal (1:3)

Current Actuarial Modelling Practice and Related Issues and Questions  
Angus S Macdonald North American Actuarial Journal (1:3)

## **6. STATISTICAL METHODS**

**Aims:**

To provide the skills and expertise in the use of models appropriate 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

**Indicative Reading:**

Actuarial Mathematics  
Bowers et al

Casualty Actuarial Society textbooks for their examinations 3 and 4

Subject C2 Core Reading/Subject 104 and 106 Core Reading  
Faculty and Institute of Actuaries

## **7. ACTUARIAL MATHEMATICS**

**Aim:**

To provide the skills and expertise in the mathematics that are of particular relevance to actuaries working in life insurance, pensions, health care and general insurance.

**Topics:**

- Actuarial mathematics as applied to life insurance, pensions, health care and general insurance
- Types of products and plans - individual, group and social insurance arrangements
- Pricing or financing methods of products and plans
- Reserving
- Reinsurance

**Indicative Reading:**

Life Insurance Mathematics  
Gerber

Actuarial Mathematics (Part A)  
Bowers et al

Core Reading for Subjects 104 and 105  
Faculty and Institute of Actuaries

Casualty Actuarial Society textbooks for their examinations 5 and 6

Actuarial Practice of General Insurance  
Hart, Buchanan and Howe, Institute of Actuaries of Australia

Subject G Core Reading - Subject 303, 403 Core Reading  
Faculty and Institute of Actuaries.

## **8. INVESTMENT AND ASSET MANAGEMENT**

### **Aim:**

To develop the ability to apply actuarial principles to the valuation, appraisal, selection and management of investments.

### **Topics:**

- The objectives of institutional and individual investors
- Types of investment (bonds, shares, property and derivatives)
- Regulation and taxation of investments
- Valuation of investments
- Portfolio selection - incorporating assessment of relative value
- Performance measurement
- Portfolio management

### **Indicative Reading:**

Most investment textbooks are either too theoretical or too practical, not mathematical enough and country specific. There are however several US textbooks which contain some material which would be appropriate. These include:

Investments

Sharpe, W F (1978) published by Prentice Hall, New Jersey

Modern Portfolio Theory and Investment Analysis (5th edition)

Elton, E J and Gruber, M J (1995) published by Wiley Radcliffe

Parts of the textbook currently being prepared by the Society of Actuaries

Panjer H H (ed.)(1998) Financial Economics : with Applications to Investments, Insurance and Pensions might also be suitable.

Options, Futures and Other Derivatives (3rd edition)

Hull, J C (1997) published by Prentice Hall International

The relevant parts of Core Reading for Subjects 1 - 2, 109 and 301  
Faculty and Institute of Actuaries

## **9. PRINCIPLES OF ACTUARIAL MANAGEMENT**

### **Aim:**

To develop the ability to apply the principles of actuarial planning and control needed for the operation of risk related programs on sound financial lines.

**Topics:**

- The general operating environment
- Assessment of risks
- Product design and development
- Pricing and assumptions
- Reserving and valuation of liabilities
- Asset and liability relationships
- Monitoring the experience
- Solvency of the provider
- Calculation and distribution of profit (surplus)

**Indicative Reading:**

Core reading Subjects 302, 303, 304 - F, G, H  
Faculty and Institute of Actuaries

Actuarial Control Cycle  
Institute of Actuaries of Australia

Pensions - see Annotated Reading List for Pensions  
Faculty and Institute of Actuaries

General Insurance - Actuarial Practice of General Insurance  
Hart, Buchanan and Howe, IoAA

**10. PROFESSIONALISM****Aim:**

To develop awareness of professionalism issues and the importance of professionalism in the work of an actuary.

**Topics:**

- Characteristics and standards of a profession
- Code of conduct and practice standards
- The regulatory roles of actuaries
- The professional role of the actuary

**Indicative Reading:**

Professionalism Course: Participants Course Notes  
Faculty and Institute of Actuaries

Professional Ethics Course: Handouts  
Society of Actuaries

Code of Conduct - relevant actuarial body

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