

---

# CHANGES TO THE EDUCATION SYSTEM OF ACTUARIES IN AUSTRALIA

MARTIN STEVENSON, AUSTRALIA

## Introduction

1. 1996 brings significant changes to the education system of actuaries in Australia. The changes have widespread support from Australian actuaries and in the long run should result in increased opportunities for consulting actuaries.

The changes attempt to address significant trends in Australia:

- the need for actuaries to obtain employment in the wider field, as the traditional disciplines are either in steady state or declining mode as areas of employment opportunities;
- the increasing specialisation of actuarial employment;
- the conflicting demands placed on actuaries of higher performance standards required by employers and higher quality demanded of the education process;
- the desire to distil the essential actuarial process in one subject rather than a number of subjects (currently four in Australia).

## Structural change

2. The 1995 (and previous years) system may be described as:
  - Building Blocks;
  - Practical subjects (2 Ordinary and 2 Specialist).

---

The 'Building Blocks' are the technical competencies that are reasonably common throughout the actuarial world: financial mathematics or compound interest, probability, statistics, basic economic, accounting and investment principles, technical application of probability and compound interest to single and multiple decrement functions, technical application of statistics to actuarial problems and straightforward application of statistics to mainstream actuarial work.

The 'Practical Subjects' are devoted to the four main areas of actuarial practice in Australia: Life Insurance, Superannuation, General Insurance and Investment and Finance. To qualify as a Fellow of the Institute of Actuaries of Australia, a student must pass two subjects at the Specialist level and two subjects at the Ordinary level.

To pass at the Ordinary level, students must demonstrate:

- (i) a sound grasp of the material in the course of the reading;
- (ii) a good understanding of concepts and principles;
- (iii) judgement applied to more straightforward practical situations;
- (iv) the ability to recognise situations where the assistance of a more experienced actuary is required.

To pass at the Specialist level, the candidate must demonstrate:

- (i) a sound grasp of the (more extensive) material in the course of reading;
- (ii) a very clear understanding of concepts and principles;
- (iii) familiarity with the literature and current developments in the subject;
- (iv) judgement applied to more complex practical situations;
- (v) the ability to recognise situations where the assistance of an experienced actuary is required.

3. The new arrangements (ignoring transitional provisions) are:

- 
- Building Blocks;
  - The Actuarial Control Cycle;
  - Practical Subjects (2 Specialist).

The main change is the introduction of the actuarial control cycle, and the reduction in the number of Practical subjects from four to two. At the same time, the choice of practical subjects has increased from four to five.

### **The Actuarial Control Cycle**

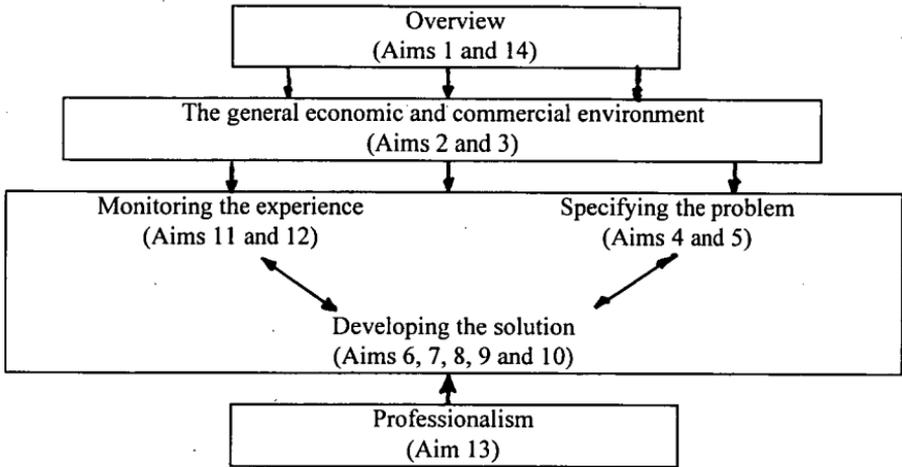
4. The aim of the actuarial control cycle subject is to provide the actuary with the generalised actuarial approach necessary to tackle a range of commercial problems including, but not restricted to, those associated with risk-based and other products offered by financial institutions. The subject is deliberately not specific to any single area of practice but will draw examples and implications from many areas of work including investments, finance, life insurance, general insurance and superannuation and other areas not normally associated with actuaries.

After passing this subject, the student will be able to:

- (i) Discuss the actuarial control cycle and explain the purpose of each component within it.
- (ii) Explain the importance of the main features within the general environment in Australia as they affect medium-to-long term commercial decisions.
- (iii) Analyse the main features of a selected range of both investment and non-investment risk-based products and the implications of the general business environment for the provider of these products.
- (iv) Assess the risks relevant to particular commercial situations and suggest how they can be handled.
- (v) Discuss alternative designs of policies which may be suitable to provide protection to consumers in respect of a range of financial risks.

- 
- (vi) Explain the advantages of using models, describe the main features of the models required for decision making purposes and how they should be used to establish and test the best solution for the client's problem.
  - (vii) Discuss the assumptions that need to be used in the pricing and ongoing management of financial products.
  - (viii) Describe how reserves, where necessary, could be calculated and how these could vary using different methods and assumptions.
  - (ix) Describe the different investment alternatives that are available and how these should be chosen in view of the liabilities.
  - (x) Discuss alternative definitions of solvency and how to assess future levels of solvency.
  - (xi) Describe how the actual experience should be monitored and assessed.
  - (xii) Identify the sources of any profit and discuss the factors that affect the distribution of this profit.
  - (xiii) Apply the tests of professionalism.
  - (xiv) Explain how the actuarial control cycle approach and actuarial techniques can be used to tackle many commercial problems.

5. In Australian papers, the actuarial control cycle is usually portrayed as a dynamic system as follows:



6. The decision to move to the ACC raises extremely fundamental issues. **Firstly**, the ACC encapsulates the essence of the definition of an Actuary.

The draft vision statement of the Institute of Actuaries of Australia states:

'Actuaries combine mathematical, statistical, economic and financial techniques and apply them to a wide range of practical business and social purposes. These include the areas of insurance, investment and superannuation.'

The expertise of the Actuary lies in analysing, modelling, applying judgement and providing practical relevant and objective advice on assets, liabilities, their interactions and the impact of future uncertain events.'

The Actuarial Control Cycle is a holistic approach which incorporates the above definition of an Actuary in a general, non-specialist way.

**Secondly**, the ACC is intended to ensure that the common techniques are only taught once, rather than appearing in different guises in a range of subjects.

---

**Thirdly**, the ACC should facilitate actuaries moving into the wider field. If students grasp the underlying principles that are used by actuaries, rather than perceiving those techniques being the domain of particular subject specialities, then there is a greater likelihood of future actuaries being able to apply the techniques to completely new disciplines. Similarly the ACC should facilitate the process of the Institute of Actuaries of Australia introducing new specialist subjects in the future.

**Fourthly**, the Institute of Actuaries of Australia anticipates that employers will view graduates with an ACC qualification as a valuable resource.

### **The Building Blocks**

7. The Building Blocks have undergone a change in form rather than substance. Currently students may sit the examinations at selected universities, and this role remains unchanged.

The other way that students may sit the examinations is through correspondence with the UK actuarial bodies. The Australian Institute has now taken over this role for itself. However, it has then subcontracted the courses and examinations to the self-same UK actuarial bodies!

The process has, however, given the Australian Institute the flexibility to change the syllabus itself in the future. A future reform that I favour is for the subjects to be international. That is, there is no reason why all actuarial bodies world wide should not teach the same building blocks.

### **The Practical Subjects**

8. The first change is that students only need to pass two subjects rather than four. This change is a result of the introduction of the actuarial control cycle.

The specialist subjects retain their traditional roles: to ensure that the actuary has a highly developed body of knowledge in a particular area of expertise and to ensure that actuaries can bring a disciplined approach to problem solving and that they can apply judgement to situations where there may be more than one approach possible.

---

The work of actuaries is becoming increasingly specialised. In my early years of consulting it was not unusual for consulting actuaries to work in all disciplines - superannuation, life insurance, general insurance, investment and finance. This diversity is now extremely rare, and the majority of consulting actuaries expect to work in one or at most two disciplines. Thus for the majority of actuaries, at least two out of the four specialist subjects are perceived as having no value for their future working life-time.

The second change is that the old 'Investment and Finance' syllabus has been split into subjects: 'Investment Management' and 'Finance'. The scope of these courses is indicated by the syllabi which are set out in Appendix A.

There are two aspects to this change. Firstly, the Institute of Actuaries of Australia has identified Finance and Investment as growth areas for the actuarial profession in Australia. It is an interesting by-product of the new educational system that new actuaries may qualify without specialising in any liability subject.

The second aspect is simply that the Institute of Actuaries of Australia has expanded the number of subjects. This expansion is likely to be the start of a trend - to assist the growth of the profession and to fill the 'gap' caused by 'traditional' subjects inevitably declining in respect of the amount of employment offered to qualified actuaries.

## **Outsourcing**

9. Education is an enormous user of actuarial resources. About one-third of the non-retired Fellows in Australia are involved in the education process, essentially in a voluntary capacity. However actuaries, as for all executives and professionals around the world, are under increasing pressure from their employers to 'perform'. At the same time students are demanding (and have a right to expect) a very high level of professionalism from the education system.
10. The Institute of Actuaries of Australia has used the Universities in Australia as a means of teaching and examining the Building Blocks. In recent years, and in the future, the role of external bodies has been and is expanding:
  - the Universities continue to teach and examine the building blocks;

- 
- the Universities take on the role of teaching and examining the Actuarial Control Cycle;
  - The Securities Institute of Australia (SIA) provides tuition and examination of subjects in both the Investment and Finance courses;
  - apart from the SIA courses, the Investment Management subjects consist of a partial course and an examination of the IAA;
  - apart from the SIA course, the Finance subject consists of a University course which has no exam. The Institute conducts the exam but there is no direct IAA course.

The entire procedure involves extensive use of outside educational facilities, thus obtaining the benefits of economies of scale, but at the same time the specialist subjects contain examinations (totally or in part) that are conducted by the Institute, thus ensuring that the qualities of judgement and analytical problem solving can be tested.

### **Professionalism**

11. The current Institute of Actuaries of Australia approach is to have a compulsory two day professionalism course for students who have passed all the examinations. Students 'pass' this course by simply attending. This process demeans the importance of professionalism.

Under the new arrangements, professionalism is included in the ACC, and should be afforded a higher priority.

---

## APPENDIX A

### INVESTMENT AND MANAGEMENT SYLLABUS

1. Economics for Investment:
  - Economic Policy, Economic Models
  - Measures of Economic Activity.
2. Accounting for Investment:
  - Profit and Loss, Balance Sheets;
  - Statement of Cash Flow/Source and Application of funds;
  - Financial Statement Analysis.
3. Statistics for Investment:
  - Moments of Distributions, Price Distributions vs Return Distributions;
  - Simple Regression, Time Series Models
  - Indices and methods of Construction.
4. Regulation of Investment markets:
  - Corporations Law, Other Regulatory Bodies;
  - Taxation.
5. Investment Characteristics:
  - Asset Returns, Debt Securities, Equity Securities, Property, Derivative Securities;
  - Other Investments.
6. Investment Valuation:
  - Debt Securities;
  - Equity Securities (Fundamental Analysis, Company Analysis);
  - Technical Analysis;
  - Valuation Methods;

- 
- Capital Market Theory;
  - Property;
  - Derivative Securities (Options, Futures, Swaps);
  - Valuation of Other Investments.

7. Investment Management:

- Investment Principles and Objectives;
- Asset and Liability Modelling, Asset Allocation Strategies;
- Fixed Income Portfolio Management;
- Equity Portfolio Management
- Property Management;
- International Portfolio Management;
- Derivative Portfolio Management;
- Strategy Implementation;
- Investment Manager Selection;
- Performance Measurement and Limitations

---

## FINANCE SYLLABUS

### Corporate Finance Module

1. Capital Budgeting and Risk:
  - Expected return and risk, business risk and financial risk;
  - Capital structure and expected return;
  - Weighted average cost of capital;
  - Certainty equivalents;
  - Sensitivity and break-even analyses;
  - Simulation and decision trees.
2. Dividend Policy:
  - Forms of dividend;
  - Taxes and dividend policy.
3. Capital Structure and Cost of Capital:
  - Effect of leverage, taxes and capital structure;
  - Bankruptcy costs;
  - Pecking order hypothesis;
  - Interactions of investment.
4. Option Valuation and Corporate Liabilities:
  - Option payoffs and simple valuation;
  - Default on debt as an option;
  - Real options, option to abandon, valuation of warrants and convertibles.
5. Debt Financing:
  - Valuing risky debt, term structure, repayment provisions;
  - Leasing.
6. Mergers and Acquisitions:

- 
- Motives for mergers, estimating costs, mechanics, tactics, legal requirements.

### **Capital Markets Module**

#### **1. Futures, Swaps and Interest Rate Options:**

- Contract specifications, payoffs, uses, market mechanisms, trading strategies.

#### **2. Option Valuation:**

- Black-Scholes model and adjustments;
- Weiner process and binomial model;
- Empirical distributions, modelling volatility.

#### **3. Valuation of Interest Rate Derivative Securities:**

- Forward and futures prices, valuation of swaps, term structure theories;
- Weiner processes and binomial model for interest rates;
- Valuation based on market price of interest rate risk;
- Equilibrium arbitrage free models;
- No arbitrage term structure fitted models.

#### **4. Exotic Options:**

- Basket options.

#### **5. Hedging:**

- Delta, theta, gamma, rho, vega hedging;
- Synthetic option replication;
- Portfolio insurance.

#### **6. Credit Risk:**

- Default risk on derivatives;
- Bank capital adequacy requirements.