

# **Actuarial Education and Professional Development Internationally**

Yangon, Myanmar

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# International Actuarial Association

## Requirements for becoming Full Member

- code of conduct
- disciplinary scheme
- due process for adopting standards of practice
- education of newly qualified actuaries meets requirements of core syllabus and guidelines
- pay annual dues to IAA



# IAA Core Syllabus

**Ten subject areas – starting with 7 core technical topics**

- financial mathematics
- probability and mathematical statistics
- economics
- accounting
- modelling
- statistical methods
- actuarial mathematics



# IAA Core Syllabus

## Then 2 application topics

- investment and asset analysis
- actuarial risk management

## ...finishing with

- professionalism



# IAA Core Syllabus

## Financial mathematics , which includes

- deterministic theory of interest rates
- generalised cash-flow models
- contingent claims analysis
- term structure of interest models
- stochastic financial calculus
- dynamic portfolio management
- applications to insurance and financial liabilities



# IAA Core Syllabus

## Actuarial mathematics, which includes

- nature of events giving rise to a contingency
- typical solutions offered by insurance, social insurance, etc.
- actuarial methods for evaluating the prospective cost of solutions
- actuarial methods for monitoring the results and maintaining financial stability, such as:
  - reserving
  - financial reporting
  - reinsuring
  - profitability analysis
  - financial condition analysis



# IAA Core Syllabus

## **Actuarial risk management, which includes**

- risk types and risk measures
- management of risks and methods of reducing exposure
- monitoring the experience and exposure to risk
- management of the relationships between assets and liabilities
- profitability of the enterprise and management of capital
- principles of regulation of financial institutions



# IAA Core Syllabus

## Professionalism

- characteristics and standards of a profession, including 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 or other stakeholders
- regulatory roles of actuaries
- the professional role of the actuary





# International Actuarial Education

## Alternative approaches

- examinations set by professional associations
- university education
  - plus work experience
  - plus defence of dissertation and work experience
  - plus some professional exams
  - accredited by professional associations for exam waivers
- government-sponsored actuarial examinations
- recognition of qualifications obtained elsewhere



# International Actuarial Education

## Actuarial examining bodies

- Institute and Faculty of Actuaries (UK based)
- Society of Actuaries (North America based)
- Casualty Actuarial Society (general insurance – US based)
  
- Institute of Actuaries of India
- Institute of Actuaries of Australia
- Actuarial Society of South Africa
- Institute of Actuaries of Japan
- China Actuarial Association
- German Actuarial Association



# International Actuarial Education

## University approach

- first degree (bachelors) in
  - mathematics
  - economics
  - risk management
  - actuarial science
  - business studies
  - other
- second degree (masters)
  - with specialisation in actuarial science
  - dissertation
- additional education on business application, local regulatory framework and professionalism



# International Actuarial Education

## Institute and Faculty of Actuaries – Initial Education

- Core Technical Subjects 1 to 8 (IAA subjects 1 to 7)
- Business Awareness Module – 2 day course (CT9)
- Actuarial Risk Management (CA1) (IAA subjects 8 and 9)
- Modelling 2-day practical exam (CA2)
- Communications 2-day practical exam (CA3)
- Specialist Technical (ST) – pass 2 subjects out of:
  - Life insurance
  - Pensions
  - Investment
  - Finance
  - Health and care
  - Enterprise Risk Management
  - General insurance (2 subjects available)
- Specialist Application (SA) – pass 1 subject out of 6



# Certified Actuarial Analyst (CAA)

## - what is it?

- IFoA is currently developing a new qualification – the **Certified Actuarial Analyst (CAA)**
- in response to international market needs
- primarily aimed at those working with actuaries in support roles around the world,
  - equipping them with sound technical skills.
- Certified Actuarial Analysts will be members of IFoA
  - but will not be ‘qualified actuaries’



# CAA – Target markets

- those undertaking processing work and support roles (mathematical calculations, data analysis, etc) alongside actuaries
- international and off-shore ‘back office’ functions
- new markets where there is a need to build basic actuarial skills (actuarial capacity-building)



# CAA – examination requirements

5 technical exams, focusing mainly on calculations and bookwork plus a practical exam on spreadsheet modelling:

<b>Module 0: Entry Test</b> <i>(candidates must pass this before they can take any further modules)</i>			
<b>Module 1: Finance and Financial Mathematics</b>	<b>Module 2: Statistics and Models</b>	<b>Module 3: Long Term Insurance Mathematics</b>	<b>Module 4: Short Term Insurance Mathematics</b>
<i>When these modules have been passed, the candidate must then pass:</i>			
<b>Module 5: Models and Audit Trails</b>			

- learning materials available online



# CAA – qualification requirements

- minimum 2 years' part-time study to qualify
- Module 0 can be taken by non-members
- Modules 0-4 will be delivered by Computer Based Assessment
- Module 5 will be delivered by online Practical Assessment
- it is a general global qualification, not practice-specific
- work-based skills requirement to become a CAA
  - one year, including emphasis on communication





# The CAA qualification

On passing all the exams, students would have the necessary mathematical skills and understanding to enable them to carry out the calculations underpinning the determination of:

- the premiums which need to be charged for products, schemes, contracts and other arrangements which provide benefits on contingent events.
- the reserves which providers of such benefits need to hold in order to meet future liabilities.
- the value of the assets in which providers of such benefits invest such reserves



# Regulation of CAAs

- there will be an ongoing CPD requirement and a professional skills training requirement
- Certified Actuarial Analysts must comply with The Actuaries' Code
- CAAs will be subject to the IFoA Disciplinary Scheme and CPD
- CAAs will not be qualified actuaries and should not describe themselves as actuaries but as actuarial analysts



# CAA – Timetable and costs

- first Module 0 exams 4-15 August 2014
- later modules starting in 2015
- subscriptions and fees

	Full	Reduced
Admission	£99	£99
Student subscription	£170	£69
Module 0	£99	£49
Modules 1-4	£130	£60
Module 5	£195	£90
Work-based skills	£40	£40
Total over first 3 years	£1463	£725



# CAA – membership package

- reduced rates apply if earnings less than GBP 5,100 a year
- part of the global IFoA community
- benefits will include: CPD, events, networking opportunities, The Actuary magazine, member interest groups, webcasts
- support from the IFoA throughout their career
- Certified Actuarial Analysts will not be entitled to vote



# CAA – the syllabus

- Topic 1 – Numerical methods
- Topic 2 – Mathematical constants and standard functions
- Topic 3 – Algebra
- Topic 4 – Calculus
- Topic 5 – Probability and statistics



# CAA – the syllabus (Topic 1)

- Topic 1 – Numerical methods
  - linear interpolation
  - solving equations iteratively
  - simple calculations with vectors and matrices
- Topic 2 – Mathematical constants and standard functions
- Topic 3 – Algebra
- Topic 4 – Calculus
- Topic 5 – Probability and statistics



# CAA – the syllabus (Topic 2)

- Topic 1 – Numerical methods
- Topic 2 – Mathematical constants and standard functions
  - definitions and properties of  $x^n$ ,  $c^x$ ,  $e^x$ ,  $\ln x$
  - sketching simple graphs of functions
  - understanding limits and bounds of functions
- Topic 3 – Algebra
- Topic 4 – Calculus
- Topic 5 – Probability and statistics



# CAA – the syllabus (Topic 3)

- Topic 1 – Numerical methods
- Topic 2 – Mathematical constants and standard functions
- Topic 3 – Algebra
  - solving simple simultaneous equations and quadratic equations
  - solve simple inequalities
  - $\Sigma$  and  $\Pi$  notation for sums and products and summing simple series
  - solve first and second order difference equations
- Topic 4 – Calculus
- Topic 5 – Probability and statistics





# CAA – the syllabus (Topic 4)

- Topic 1 – Numerical methods
- Topic 2 – Mathematical constants and standard functions
- Topic 3 – Algebra
- Topic 4 – Calculus
  - differentiation and integration
  - finding maxima and minima
  - understand partial derivatives
  - solve indefinite and definite integrals
  - state and apply Taylor series and Maclaurin series
- Topic 5 – Probability and statistics



# CAA – the syllabus (Topic 5)

- Topic 1 – Numerical methods
- Topic 2 – Mathematical constants and standard functions
- Topic 3 – Algebra
- Topic 4 – Calculus
- Topic 5 – Probability and statistics
  - data analysis
  - concepts of probability
  - permutations and combinations
  - random variables, distribution functions, expected value and moments



# CAA – Exam Module 0 – example

Determine the derivative of  $(e^x + 2x)(x^2 - 2x)$

- A  $2xe^x - 2e^x + 4x^2 - 4x$
- B  $2xe^x - 2e^x + 4x^2 - 4$
- C  $x^2 e^x - 2e^x + 6x^2 - 8x$
- D  $x^2 e^x - 2xe^x + 2x^2 - 4x$

Solution for student to work out in exam:

$$\frac{d}{dx} \{(e^x + 2x)(x^2 - 2x)\} = (e^x + 2x) \cdot (2x - 2) + (e^x + 2) \cdot (x^2 - 2x)$$

$$\begin{aligned} &= 2xe^x + 4x^2 - 2e^x - 4x + x^2 e^x + 2x^2 - 2xe^x - 4x \\ &= x^2 e^x - 2e^x + 6x^2 - 8x \end{aligned}$$

Answer is **C**



# CAA – Exam Module 0 – example

The number of claims,  $X$ , on an extended warranty policy for a particular model of toaster has the following probability distribution:

$x$	0	1	2	3	4	5
$P(X=x)$	0.08	0.16	0.22	0.35	0.17	0.02

Calculate  $P(X>2)$

- A 0.22
- B 0.24
- C 0.54
- D 0.76

Solution for student to work out in exam:

$$P(X>2) = P(X=3) + P(X=4) + P(X=5) = 0.35+0.17+0.02 = 0.54$$

Answer is **C**



# International Actuarial Education

## Risk management designations – CERA

- qualified actuary in the association (meeting IAA core syllabus)
- Chartered Enterprise Risk Actuary – global designation
- treaty signed by 14 founding associations
- ...including IFoA, SoA, CAS, ASSA, IAAust, IAI
- accreditation of treaty signatories to award CERA
- intensive checking of compliance with syllabus
- IFoA's ST9 being used by several associations
- ...not just in English



# Continuing Professional Development

## CPD and the individual actuary

CPD is an important element of the actuary's lifelong process of learning and development within the profession. The initial qualification process is the first step in this journey. Thereafter, it is the responsibility of all actuaries to plan their own professional development programme.

- most associations set CPD requirements for their members



# Options for Myanmar

- use examinations of Institute and Faculty of Actuaries or Society of Actuaries or Casualty Actuarial Society
- Certified Actuarial Analyst (IFoA)
- tailored diploma programme (subject to funding)
- series of seminars using resources from AWB (Actuaries without Borders)
- develop training the trainers programme for local university lecturers in order to build teaching capacity
- link up with universities with developed actuarial science



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