

# Actuarial systems in Japan, U.S., and Korea and the latest initiatives of actuarial societies in those three countries

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## Language

베트남은 아름다운 나라입니다

ベトナムは美しい国です

Vietnam is a beautiful country.

## References

Fred E. Szabo

Actuaries' Survival Guide

*How to succeed in one of the most desirable  
professions*

2004 ELSEVIER Academic Press

THE ROLE OF THE ACTUARY 2013 June

By International Actuarial Society

2013 June

[http://www.actuaries.org/LIBRARY/Papers/Role\\_Actuary\\_EN.pdf](http://www.actuaries.org/LIBRARY/Papers/Role_Actuary_EN.pdf)

# What is an Actuary?

**An actuary is a business professional who analyzes the financial consequences of risk. Actuaries use mathematics, statistics and financial theory to study uncertain future events, especially those of concern to insurance and pension programs. They evaluate the likelihood of those events, design creative ways to reduce the likelihood and decrease the impact of adverse events that actually do occur.**

**Actuaries are an important part of the management team of the companies that employ them. Their work requires a combination of strong analytical skills, business knowledge and understanding of human behavior to design and manage programs that control risk.**

**SOA members work in life insurance, retirement systems, health benefit systems, financial and investment management and other emerging areas of practice. The majority of actuaries work within the insurance industry, although a growing number of actuaries work in other fields.**

<http://www.soa.org/about/about-what-is-an-actuary.aspx>

## About SOA

### The Professional Life

**Wherever there is risk, there are opportunities for actuaries. And the recent financial crisis has further highlighted the skills actuaries bring to the table.**

[http://www.youtube.com/watch?feature=player\\_embedded&v=rQop4TLj4WI](http://www.youtube.com/watch?feature=player_embedded&v=rQop4TLj4WI)

# What is an Actuary

## Professional Options

- The word *actuary* comes from the Latin word *actuarius*, which referred to short-hand writers in the days when things like typewriters and computers hadn't even been thought of.
- Today, actuaries work for insurance companies, consulting firms, government departments, financial institutions, and other agencies.
- They provide crucial predictive data upon which major business decisions are based. True to their historical roots, actuaries still use a rather extensive shorthand for many of the special mathematical functions required for this work.
- Actuarial science is an exciting, always-changing profession, based on fields such as mathematics, probability and statistics, economics, finance, law, and business. Most actuaries require knowledge and understanding of all of these fields and more.

# What is an Actuary

## Professional Options

- To ensure that this is really the case, all actuaries must pass special examinations before being recognized as members of the profession. To perform their duties effectively, actuaries must also keep abreast of economic and social trends, as well as being up-to-date on legislation governing areas such as finance, business, healthcare, and insurance.
- No doubt you have heard about the actuarial examinations you need to pass to become an *Associate* or *Fellow* of one of the actuarial societies.
- The efforts required to succeed in these examinations are in many ways analogous to those required to become a doctor, lawyer, or other high ranking professional.
- So are the rewards. For several years now, the **Jobs Rated Almanac** has considered an actuarial career to be one of the most desirable professions in America.

# Job rates almanac

## The Best Jobs of 2013 - Actuary #1

- The job “actuary” has been rated as 2013’s best job in the United States by Careercast.com. Careercast.com ranked actuary as No. 1, biomedical engineer at No. 2, and software engineer, the top job of 2012, at No.3.
- Careercast.com ranks careers based on dozens of factors, such as
  - ✓ the degree of hazards personally faced,
  - ✓ physical demands (crawling, stooping bending, etc.),
  - ✓ income growth potential,
  - ✓ employment outlook,
  - ✓ competitiveness,
  - ✓ travel and contact with the public.

The firm used data from the Bureau of Labor Statistics and other government agencies to determine the rankings. As in prior years, the 200 jobs were selected for their relevance in the current labor market as well as the availability of reliable data.

Careercast.com

- See more at: <http://www.beanactuary.org/news/?fa=view&id=2218#sthash.LQAL7ab1.dpuf>



# Job rates almanac

## The Best Jobs of 2013 - Actuary #1

- **The Ten Best Jobs:**
- Actuary
- Biomedical Engineer
- Software Engineer
- Audiologist
- Financial Planner
- Dental Hygienist
- Occupational Therapist
- Optometrist
- Physical Therapist
- Computer Systems Analyst

Careercast.com

- See more at: <http://www.beanactuary.org/news/?fa=view&id=2218#sthash.LQAL7ab1.dpuf>

# What is an Actuary

## Professional Options

- Actuaries are experts in the assessment and management of risk. Tradition-ally, the risks managed by them have been insurance and pension funding risks, although the management of business risks is also among the responsibilities of insurance actuaries.
- So is the insurance of insurance, known as *reinsurance*. Moreover, many actuaries are now also managing asset-related risks in merchant banks and consulting firms.
- Actuaries are often chosen to be general managers in insurance companies. This is because upper management and boards of directors have a high regard for the knowledge and skills of actuaries, and because the need of a company to maintain its financial integrity makes an actuary's numerical skills invaluable.

# What is an Actuary

## **Actuarial Terms, Acronyms, and Definitions**

- You will quickly discover that actuarial science is full of technical terms, acronyms (abbreviations), and definitions.
- This session is not the place for explaining them in detail, because the definitions involved are readily available in textbooks and on the Internet.
- The main objective of this session is to introduce you to the career opportunities that exist in the actuarial world and to sketch for you the steps required to enter that world.
- Actuaries can be grouped in different ways. As their functions change in response to changes in the world around us, the distinctions become less sharp. However, the categories of employment will give you an initial idea.

# What is an Actuary

## Valuation Actuaries

- Reserves are important to the long-term financial health of a company.
- Because insurance companies are dealing with events that are uncertain in time and amount, they must put aside what they consider to be the most likely amount of money they will need to pay future claims and expenses, and then put aside a little more, just in case.
- The role of *valuation actuaries* is to determine the appropriate amount to be put aside and validate the expected number of claims, which should be what was taken into account when setting the price of the insurance.
- Valuation actuaries also certify the reserves to government agencies.

# What is an Actuary

## Pricing Actuaries

- *Pricing actuaries* are responsible for determining how much money a company is likely to make on a product.
- A product can be life insurance, which pays an agreed-upon sum to your beneficiary when you die, an annuity, which pays an agreed-upon sum every month as long as you live, or some form of health insurance, which covers the costs of medical care not paid for by a government plan, for example, dental and drug expenses.
- Pricing actuaries use the same assumptions as valuation actuaries when calculating the price of insurance to guarantee consistency and ensure that when valuation actuaries believe that they are adding a little extra to the reserves, they are really doing so.
- Pricing actuaries generally do not certify anything to anyone outside of the company.

# What is an Actuary

## Consulting Actuaries

- *Consulting actuaries* spend a good deal of their time advising on defined benefit pension plans.
- These are trusts set up to fund tax-assisted retirement benefits at a rate spelled out in a legally certified document.
- In the United States, senior consulting actuaries are usually members of the Conference of Consulting Actuaries (CCA). To become a *Member* of the CCA, candidates must have completed a minimum of 12 years of responsible actuarial work, defined as "work that requires knowledge and skill in solving actuarial problems."
- They must also be a Fellow or Associate of the Society of Actuaries or the Casualty Actuarial Society; or a Fellow of the Canadian Institute of Actuaries, the Faculty of Actuaries, or the Institute of Actuaries; or be enrolled with the Joint Board for the Enrollment of Actuaries (EA), thus having acquired the title of *Enrolled Actuary*; or be a *Member* of the American Academy of Actuaries, the *Asociacion Mexicana de Actuarios Consultores*, the *Asociacion Mexicana de Actuarios* or the *Colegio Nacional de Actuarios*.

# What is an Actuary

## Pension Actuaries

- *Pension actuaries* look at all members of a pension plan, their ages and salaries, and projects how much each would receive at retirement on average, given that some will terminate before retirement, some will get salary increases, and other such assumptions as to what might happen in the future. Then they look at the assets the pension plan has invested and determine, based on these two analyses, how much the plan's sponsor (usually an employer) needs to contribute to the plan each year. The pension actuary certifies that the contributions needed to fund the plan are adequate and qualify for a tax deduction for the sponsor.
- Pension laws and pension regulations are country-specific. This is the one area in which the global mobility of actuaries is somewhat restricted. Special examinations must be passed in the country of employment to be a pension actuary. In the United States, pension actuaries must be Enrolled Actuaries to be eligible to perform government-related pension fund audits. Enrolled actuaries are also employed in the human resource departments of large companies.
- Senior pension actuaries in the United States are usually also Fellows of the American Society of Pension Actuaries (ASPA), a designation that is awarded only after successful completion of a series of professional examinations.
- The basic examinations are those required to become an Enrolled Actuary, together with three additional ASPA examinations.
- A Fellow of the Society of Pension Actuaries must also be a Fellow or Associate of one of the following societies: the Society of Actuaries, the Casualty Actuarial Society, the Canadian Institute of Actuaries, the Faculty of Actuaries, and the Institute of Actuaries, or be a Member of the American Academy of Actuaries, the Asociacion Mexicana de Actuarios Consultores, the Asociacion Mexicana de Actuarios, or the Colegio Nacional de Actuarios. Although you will see later in this chapter that the actuarial profession is globally mobile, pension actuaries in many countries must meet certain specific national certification standards.

Quoted from Fred E. Szabo "Actuaries' survival Guide" Academic Press (2004) p4

# What is an Actuary

## Financial Actuaries

- As the worlds of banking, insurance, and finance become more entwined, a new breed of actuary is emerging, known as a *financial actuary*.
- An advertisement for a senior financial actuary on the Internet describes one of the novel roles of actuaries in business.
- A company was looking for a senior financial actuary whose responsibilities included *developing, analyzing, and testing models of In-ternet credit card processing systems including product pricing, positioning, and consumer credit, in order to minimize risk and improve return on investment*.
- *You will communicate assumptions, results, and alternatives to staff and provide guid-ance in systems reengineering.*
- A suitable candidate was expected to have at least a Bachelor's degree in actuarial science, finance, mathematics, or a related field and be an Associate Actuary. In addition to appropriate experience, the candi-date was expected to be an effective communicator, and creative thinking skills were essential. The company was looking for a self-starter with a strong statistical background and proven expertise in modeling techniques. Moreover, knowledge of the financial and management needs of an Internet real-time credit card processing company was expected.

Quoted from Fred E. Szabo "Actuaries' survival Guide" Academic Press (2004) p5



# What is an Actuary

## What Does It Take to Become an Actuary?

- Skills needed include mathematical ability, knowledge of and comfort with computers and computer modeling systems, and the ability to communicate complex topics in terms that customers can understand.
- Most actuarial positions require that you are at least an Associate of the Society of Actuaries, the Casualty Actuarial Society, the Canadian Institute of Actuaries, or have equivalent standing in an actuarial society of another country.
- If you are in a position that requires you to certify actuarial valuations and reports, you must usually be a Fellow of these societies.
- Many actuaries in the United States are also members of the American Academy of Actuaries (*see Appendix D*), the *public policy, communications, and professionalism organization for all actuaries in the United States*.
- Actuaries in different countries belong to wide variety of national and international professional organizations that define and direct the future of the profession. At the international level, the International Association of Actuaries plays a central role in coordinating and advancing global actuarial interests.

# Benefit and Rewards

## Benefit and Rewards

The author of the quoted book has interviewed hundreds of students who have chosen to be actuaries. They all have one thing in *common* - *they all love mathematics*. Here is what some of them, and some of their employers, have given as reasons for their career choice.

**Q Did you ever consider working in a non-actuarial field of applied mathematics (such as engineering) and if so, what tipped the scales in favor of an actuarial career?**

Twenty-five percent of all respondents to the survey said "No." There was no doubt in their minds that all they ever wanted to be was an actuary. The rest had considered other careers. Here is what some of them had to say.

- **Answer** I am currently working in a non-actuarial field where strong mathematical and financial skills are highly valuable. Elements that persuaded me to leave the actuarial field were salary and opportunity at the top management level.
- **Answer** Yes. Communications and media. But I found that an actuarial career provides a more secure job, a great work environment, a good reputation, excellent job opportunities, and diversification of tasks, especially at the entry level.
- **Answer** I considered studying engineering. I decided to follow an actuarial career instead because I didn't like some subjects in engineering (chemistry) and because the business part of an actuary's job interested me.
- **Answer** I considered studying engineering. But I like the fact that being an actuary means that you need to acquire knowledge not only in applied mathematics (the primary reason why we're all in this field), but also finance, economics, taxes, politics, and all those things make an actuarial career so interesting.
- **Answer** I did consider many other fields, including engineering and medicine.
- **Answer** I initially was seriously considering going into pure and applied mathematics and even engineering, until I stumbled upon actuarial science. It was the combination of the high-level applied mathematics and business skills required in this field that finally tipped the scales in favor of an actuarial career. The fact that actuarial science led to a much more rounded career appealed to me immensely and really made all the difference.

Quoted from Fred E. Szabo "Actuaries' survival Guide" Academic Press (2004) p6

# Benefit and Rewards

## Benefit and Rewards (continue)

- **Answer** Not really-I've been gunning for this since Grade 10. The workload of an engineering student at university steered me away from that, and I didn't want to be a computer programmer for my entire life.
- **Answer** Yes. Statistics. But I felt a training in actuarial mathematics was broader and that it would be easier to switch from actuarial mathematics to statistics than the other way around.
- **Answer** Yes. I applied to engineering. I then chose to become an actuary because it is more of a big-picture profession than engineering. To be an actuary you need to have a long-term vision. You need to understand trends in the economy and be able to predict where the economy will be moving in the future. The concepts and theories you learn in statistics train you to think critically, to analyze, and to recognize patterns and trends. Engineering is a more technical field and is not as conceptual as actuarial mathematics and statistics. I'm a big-picture man, and I believe that in the actuarial profession you get to see a lot more of the picture sooner. I assume that this training can also be applied to other fields in the future. It is a way of thinking and goes beyond technical knowledge.
- **Answer** I haven't so far, but I'd like to keep my options open. The biggest stumbling block would be to realize how much effort I've put into the SOA exams to become qualified as an actuary and then ask myself, "Do I really want to ditch everything I've done for my career, put more time into studying something else, and take a 30% drop in salary?"
- **Answer** I thought of being a teacher, but decided I didn't have the patience for that and I was drawn to a rotational-program setting at an insurance company so that I could have the exam support and variety of rotations. I would consider being an adjunct college professor or teaching an exam review class.
- **Answer** Yes. But I decided to go in actuarial science because it was something less well-known to me and I found that to be a real challenge.
- **Answer** I did consider it, but the job market favored actuaries at the time.

Quoted from Fred E. Szabo "Actuaries' survival Guide" Academic Press (2004) p6 - 7

# A Typical Day

## A Typical Day

Let us take a look at a day in the life of an actuary. What are the typical tasks, and how does the day evolve? Obviously the answers depend on the nature of the company and the seniority of the actuary.

Here is what several actuaries and actuarial students had to say about this in the survey:

### Q Describe a typical day in the life of an actuary.

- **Answer** Corporate stuff. Reserve valuations. Asset and liability management. Dynamic capital adequacy testing. Pricing.
- **Answer** Reading, replying and sending e-mail, letters and phone-mail. Keeping in touch with the daily activities of my clients and current economic developments. Talking many times a day with the consultants I work with to keep track of the many projects going on and address issues if necessary. Producing reports of different kinds when a consultant has to meet with a client, depending on the client's needs and what the consultant wants to show them. Calculating performance figures from the different managers investing money for a client's fund, reviewing their historical performance and comparing it with a universe of funds and benchmarks. Following up on previous reports prepared for clients that need to be updated for the coming quarter. Verifying trust statements at the end of the month to make sure there are no discrepancies with the manager's data. Carrying out all kinds of calculations that are required by the consultants in their work with clients. Lots of teamwork.
- **Answer** In the pension consulting industry, a typical day includes many phone calls with clients on subjects as varied as plan funding and investments, tax legislation, particular situation of given plan participants, union negotiations, benefit improvement, accounting treatment of pension plan, etc. Also, peer review of actuarial valuation results, planning and management of projects, business development, formal or informal training, internal or client meetings. It's rarely nine-to-five.
- **Answer** A normal day in the life of an actuary at my level involves a lot of work with computers. Checking data, using programs to calculate liabilities for pension funds, personal calculations, all that can be done in a normal day. It is also not unusual to have training sessions on hot issues or new tools.
- **Answer** I get to the office and check the e-mail and voice-mail messages. In the morning, I tend to work on projects until lunchtime and to contact my clients when problems arise. In the afternoon, I often have meetings with teams or clients, and I then keep on working on specific projects with different people.

Quoted from Fred E. Szabo "Actuaries' survival Guide" Academic Press (2004) p6 - 7

# A Typical Day

## A Typical Day (continue)

- **Answer** Consulting in group health insurance: technical work on actuarial valuation of post-retirement benefits. Core consulting: renewals, review of financial reports, benefits redesign, analysis of insurer's quotations on group insurance benefits. General advice to clients about current issues on group insurance benefits: phone calls, client meetings.
- **Answer** For an actuarial intern, there is no such thing as a typical day. The tasks vary by intern and company but usually start with daily routine jobs such as updating data, checking the results of jobs run the previous day, and meeting with your supervisor. The remainder of the day is spent working on one or possibly several projects you've been assigned. Having junior status, an intern may work for more than one actuary and is often asked to run illustrations, compute premiums, search for data, make graphs, etc.
- **Answer** There aren't too many typical days. Every day has some new wrinkle or challenge. 'Things that are done pretty much every day are working with spreadsheets to perform actuarial calculations, checking the reasonableness of the results of calculations (Are results reasonably consistent with your prior expectation of what the results should be?), communicating with both actuarial and non-actuarial co-workers in person, by phone, or by e-mail. And during exam season, studying for exams if you're still taking them.
- **Answer** Here is an account of a typical day at the office. It's basically a 10-hour day:
  - ☐ 8:00 Walk to the office.
  - ☐ 8:30 Arrive at the office; read e-mail and news
  - ☐ 9:00 Finalize calculations for the report to client ABC; give directives to assistant
  - ☐ 10:30 Preparation for meeting with client A at 1 p.m.
  - ☐ 12:00 Lunch with investment manager of firm
  - ☐ 13:00 Meeting with client A: presentation of the report submitted three days ago, discussions of the next steps and answer questions and recommendations.
  - ☐ 14:30 Prepare memo to client A following meeting concerning issues raised
  - ☐ 15:00 Debriefing with manager for client.
  - ☐ 15:15 Consult voice-mail and e-mail.
  - ☐ 15:30 Peer review report for client B.
  - ☐ 16:30 Help junior analyst with calculation program for client C.
  - ☐ 17:00 Contact Trust D for trust statement figures as of mm.dd.yyyy
  - ☐ 17:05 Search for client E: Investment manager for an equity mandate.
  - ☐ 17:55 Time entry for the day.
  - ☐ 18:00 Go home (and study for actuarial exams!!!).

Quoted from Fred E. Szabo "Actuaries' survival Guide" Academic Press (2004) p6 - 7

# A Typical Day

## A Typical Day (continue)

- **Answer** Internship in a pension consulting firm: every day is different. Different projects and obstacles to overcome. Challenging. It's hard to adjust between school and work routines. When beginning an internship, I often find myself very restless because I am not used to sitting in one place for long. At school, I never sit in one place for more than an hour.
- **Answer** I arrive at the office at 7:30a.m. I am usually the first one there, and I enjoy the quiet time to go through my e-mail.. do some deep thinking, and plan the day's work. I am in the corporate actuarial department. We set valuation policy for the company or, more accurately, develop our company's interpretation of the valuation standards set by regulators and the Canadian Institute of Actuaries. I am currently working on standards for applying the new *Consolidated Standards of Practice* to our valuation.
  - *E-mail.* The first thing I do in the morning is to read my e-mail. I send an immediate response where I can, delete any notes where no further action is needed, store notes that form part of a discussion thread, and print anything that I need to spend more time on during the day.
  - *Calendar.* Next, I check my calendar to see what meetings I have scheduled. Meetings can be a very significant portion of a working day, and if I have a memo or some other piece of work due that day, I need to do some short-term planning on how the work will get done on time. At this point I decide what I will actually do during the day. This will include meetings, project work, occasionally production work, and research.

Project work is a catchall phrase for deliverables that take longer than a day. This could include developing standards for valuation, implementing a new computer valuation system, collecting and coordinating data from different business units in support of a corporate decision. There always are one or two projects on the go that can absorb any available time in a working day not taken up by short-term requirements.

Production work is usually tied to a particular time of the month or year, and relates to reporting requirements of one kind or another. My production work is to examine and analyze the source of earnings reporting for the company. Research means reading some of the CIA or OSFI (Canadian Office of Superintendent of Financial Services) papers that have been prepared for our education. Most of this is directly relevant to my current job since my department interprets these papers for the company.
  - *The Rest.* The rest of the day is spent doing the work I have planned. My door is open, and the plans I have laid out are easily derailed if something comes up with a higher priority, such as a question from upper management

Quoted from Fred E. Szabo "Actuaries' survival Guide" Academic Press (2004) p10

# A Typical Day

## A Typical Day (continue)

- **Answer** This greatly depends on the level of responsibility held by the actuary, the size of the organization in which the actuary works, and the type of company: life versus *PIC* [Property and casualty], consultant versus insurer, and so on.
- The answer also depends on the period in question. For example, year-end will keep corporate actuaries very busy, while no overtime may be required the rest of the year. In any event, a day in the life of this actuary (meaning me) goes something like this. Bear in mind the following background information: I currently work for a small *PIC* reinsurance company (five employees), with both actuarial and underwriting responsibilities.
  - *Rating.* Most of the day I work with Microsoft Excel. My work involves rating (calculating reinsurance premiums), production of reports, or corporate functions such as calculating IBNR [incurred but not reported] loss reserves, doing DCAT [dynamic capital adequacy testing] work, and analyzing quarterly financial information. Knowledge of Microsoft Word and Microsoft Access is also required, since we often write memos and reports and all our data is stored in Access.
  - *Lunch.* Lunch is usually spent at my desk, reading e-mail, newspapers or trade magazines, in order to stay abreast of current events in the world and in the insurance industry in general. From time to time, I may go out for a lunch meeting with a client or broker. Some travel is required from time to time.
  - *The Day.* A typical day will see me coming in the office at 8:15a.m. and leaving at 5:45p.m.
- **Answer** The day in the life of an actuary depends on a variety of circumstances: insurance versus consulting, life versus *PIC*, big company versus small, traditional role versus non-traditional role, and especially the line of business the actuary is involved with-and even that can vary from day-to-day!

Actuaries I have met have handled pricing, reporting, risk management, reinsurance, and corporate and industry issues. Some are in non-actuarial roles like underwriting and senior leadership positions. Some work on group benefits (long-term disability, short-term disability, life, accidental death and dismemberment), some work on annuity products (fixed and variable), some work on life products (term, variable universal life insurance, universal life insurance), some work in investments, etc.

I don't think that there is just one way to describe an actuary's day!

Quoted from Fred E. Szabo "Actuaries' survival Guide" Academic Press (2004) p11

# Typical Responsibilities

## Typical Responsibilities

How do beginning actuaries spend their time at work, and how do these activities change as an actuary's career advances?

**Q What are some of the typical actuarial projects on which you have worked, and what specific knowledge and skills were required? Please give some illustrative examples.**

- **Answer** Union negotiations: they require strong analytical skills, a talent for multitasking, and the ability to work well under pressure.
- **Answer** Basic actuarial valuation: calculating the plan's liabilities from the data of the participants of the plan. Basic actuarial projects require rigor, methodology and planning. Preparation of accounting disclosure and calculation of pension expenses: knowledge of accounting rules and their application.
- **Answer** I've worked on annual statements. A good knowledge of Microsoft Excel and pension plans was required. Being methodical and having good organizational and language skills are important. I've also worked on actuarial evaluations. The same skills and knowledge as for the statements were needed, plus a good knowledge of valuation software, as well as familiarity with the law and the valuation process (gain and loss, reconciliation, etc.).
- **Answer** Typical projects that I have been involved with included:
  - *Valuations.* Actuarial valuations: determination of the present value of annuity benefits taking into consideration demographic factors (mortality, termination, retirement, etc.).
  - *Reports.* Financial reports: understanding how balance sheets work, statistical knowledge, analytical skills, credibility notions, software skills (Fortran, Microsoft Excel).
  - *Computing.* Software skills are crucial in the actuarial field. A good grasp of Excel, AXIS, Microsoft Visual Basic for Applications, and even APL are a great advantage and are widely used in the field.  
The main project I worked on consisted of reviewing and updating a computation made in the valuation system of an insurance company. My work was very specific and involved many calculations, running illustrations, and analyzing results.
  - *Products.* I also needed to have a good knowledge of the various products sold and their specific details. For example, if my results seemed irregular, my first instinct was to look up the product I was examining for distinct features such as product design or recent re-pricing.

Quoted from Fred E. Szabo "Actuaries' survival Guide" Academic Press (2004) p6 - 7



# Typical Responsibilities

## Typical Responsibilities (continue)

- **Answer** Typical projects that I have been involved with included:
  - *Reserves.* Calculating reserves: needed knowledge of actuarial mathematics (life contingencies, theory of interest) and general structure of reserves, as well as computer software. Knowledge of professional standards of practice is also needed.
  - *Balances.* Calculating fund balances for retirement and investment products: actuarial knowledge of the theory of interest and computer software were essential. Knowledge of legislation regulating such products is also needed.
  - *Design.* Design of insurance and investment products: Knowledge of the different mechanisms of insurance products, knowledge of different investment products, rules and regulations regarding those products, computer software, communications skills when working with others were essential.
- **Answer** Typical projects that I have been involved with include actuarial valuations of pension plan liabilities; costing of plan benefit changes; pension expenses.

The skills required for these projects were basic technical skills: mathematical, actuarial and accounting rules, knowledge of internal valuation software, and knowledge of laws affecting pension plans.

I have also written reports to clients: letters, actuarial valuation reports, investment manager monitoring reports, etc.

The skills required for this type of work are the ability to translate complex issues into understandable words, writing skills, and communication skills.
- **Answer** Typical projects that I have been involved with include the production of reports, writing, graphing, editing charts; project management (requires good planning); communication with consultants (requires knowledge of the clients I work with, knowledge of Word, PowerPoint, and Excel); returns calculations: requires knowledge of the database, and basic financial mathematics.
- **Answer** Reserve valuations, year-end and quarterly pricing, new products, modification of current products, DCAT [dynamic capital adequacy testing], business projections for the next five years, performed once a year, and MCCR [minimum continuing capital and surplus requirements] calculations.

Quoted from Fred E. Szabo "Actuaries' survival Guide" Academic Press (2004) p14

# Typical Responsibilities

## Typical Responsibilities (continue)

- **Answer** Most are in line with post-retirement benefit valuations. Specific knowledge required: applying discount and mortality data to benefits scheduled for a future date.
- **Answer** Typical projects that I have been involved with included:
  - *Valuations.* Pension plan valuations. They are needed to ensure that the retirement benefits promised to employees by their employers are available for their retirement life. A valuation calculates the value of those retirement benefit promises (pension liabilities) and compares them to the assets invested. A fully funded pension plan is a plan that currently has a level of assets sufficient to cover its pension liabilities.  
Skills required: actuarial background to calculate the required values; programming skills to understand/program/run the system on which the liabilities are calculated; analytical skills to check, compare and compile results; up-to-date knowledge on current market and economic issues used to set and understand the assumptions used in the valuation.
  - *Benefits.* Administering the benefits of expatriates working in various countries. Expatriates add another layer of complexity in benefits valuation since coordination is required between the host and home countries, as well as potential social security benefits earned in various countries.

# Typical Responsibilities

## Typical Responsibilities (continue)

- **Answer** Typical projects that I have been involved with included:
  - *DCAT*. A lot of work has been done recently on DCAT [dynamic capital adequacy testing]. Essentially, this is a financial model that projects the future financial condition of a company. The model can be deterministic or stochastic in nature. In my last three jobs, I have been involved to various degrees with this.

This type of project requires good understanding of accounting concepts (projection of balance sheet and investment income), investment concepts (calculation of market and book value of investments under various economic scenarios), financial concepts (calculation of corporate income tax), and statistical concepts (calculation of various probability scenarios). Developing appropriate business knowledge through finance, economics, investment and management courses can never be stressed enough.
  - *Computing*. Other projects that I have been involved with usually only require a good understanding of actuarial concepts, acquired through coaching and through the examination process. Expertise with Excel is always a must. So are other computing skills: Microsoft Visual Basic and SAS being the most common ones.

# Typical Responsibilities

## Typical Responsibilities (continue)

- **Answer** Typical projects that I have been involved with included:
  - *Annuities.* I've worked on developing new annuity products and riders (i.e., product management: seeing an idea develop into a real product that is sold to contract holders). Within that process, I have worked with all business areas (compliance, legal, marketing, systems, etc.) to get an idea into a working product.
  - *Ratemaking.* Other projects included setting the credited rates for our various fixed and variable annuity products.
  - *Profitability.* I have worked with in-house actuarial software to examine profitability.
  - *Verifications.* I have verified client illustrations to verify that what is being shown to a client for an annuity product's subaccount growth and death benefit calculations is accurate.
  - *Reviews.* I have also done product reviews of our existing products to validate the pricing.
  - *Economic Value.* I've worked on economic value-determining which areas of the company are contributing what value to our theoretical stock price.
  - *Reinsurance.* I also worked in reinsurance where I dealt with reinsurance intermediaries and brokers to renew contracts. This also involved assessing the risk within our existing contracts.
- **Answer** Renewal analysis (group insurance); financial statement analysis (group insurance); reserves analysis; post-retirement benefit valuation; report writing; various types of research; preparation of benefit statements; policies and booklets verification.  
Knowledge and skills: Computer knowledge (programming, Microsoft Word and Excel), communication skills (in French and English), writing skills, planning ability.
- **Answer** Actuarial valuations (knowledge: methods for valuing liabilities); accounting procedures (knowledge: basic accounting); calculations (knowledge: laws and regulations, ability to draft reports, good reading comprehension); plan design (knowledge: industry trends).

Quoted from "Actuaries' survival Guide" p16

# Typical Responsibilities

## Typical Responsibilities (continue)

- **Answer** Most are in line with post-retirement benefit valuations. Specific knowl-edge required: applying discount and mortality data to benefits scheduled for a future date.
- **Answer** Typical projects that I have been involved with included:
  - *Valuations.* Pension plan valuations. They are needed to ensure that the retirement benefits promised to employees by their employers are available for their retirement life. A valuation calculates the value of those retirement benefit promises (pension liabilities) and compares them to the assets invested. A fully funded pension plan is a plan that currently has a level of assets sufficient to cover its pension liabilities.  
Skills required: actuarial background to calculate the required values; programming skills to understand/program/run the system on which the li- abilities are calculated; analytical skills to check, compare and compile results; up-to-date knowledge on current market and economic issues used to set and understand the assumptions used in the valuation.
  - *Benefits.* Administering the benefits of expatriates working in various countries. Expatriates add another layer of complexity in benefits valuation since coordination is required between the host and home countries, as well as potential social security benefits earned in various countries.
- **Answer** Typical projects that I have been involved with included:
  - *DCAT.* A lot of work has been done recently on DCAT [dynamic capital adequacy testing]. Essentially, this is a financial model that projects the future financial condition of a company. The model can be deterministic or stochastic in nature. In my last three jobs, I have been involved to various degrees with this.  
This type of project requires good understanding of accounting concepts (projection of balance sheet and investment income), investment concepts (calculation of market and book value of investments under various economic scenarios), financial concepts (calculation of corporate income tax), and statistical concepts (calculation of various probability scenarios). Developing appropriate business knowledge through finance, economics, investment and management courses can never be stressed enough.
  - *Computing.* Other projects that I have been involved with usually only re- quire a good understanding of actuarial concepts, acquired through coach-ing and through the examination process. Expertise with Excel is always a must. So are other computing skills: Microsoft Visual Basic and SAS being the most common ones.

# Typical Responsibilities

## Typical Responsibilities (continue)

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This type of project requires good understanding of accounting concepts (projection of balance sheet and investment income), investment concepts (calculation of market and book value of investments under various economic scenarios), financial concepts (calculation of corporate income tax), and statistical concepts (calculation of various probability scenarios). Developing appropriate business knowledge through finance, economics, investment and management courses can never be stressed enough.
  - *Computing.* Other projects that I have been involved with usually only re- quire a good understanding of actuarial concepts, acquired through coach-ing and through the examination process. Expertise with Excel is always a must. So are other computing skills: Microsoft Visual Basic and SAS being the most common ones.

# Typical Responsibilities

## Typical Responsibilities (continue)

- **Answer** Cash flow testing, economic value benchmarking, product development and pricing. Helpful courses: Life contingencies, theory of interest, knowl-edge of fixed income securities.
- **Answer** An actuarial background is not a prerequisite to work in the asset con-sulting services group. Some of my colleagues have a finance background. In fact, the projects I work on are not purely actuarial projects.
- **Answer** Typical projects that I have been involved with included the following:
  - *Assets.* How should the assets of a pension plan be invested? These projects are mostly worked on by actuarial people. They require a knowledge of both the liability and assets sides of a pension plan: demographics, financial results, investment markets, etc.
  - *Investment.* Review the pension plan (statement of investment policy and procedures).
  - *Management.* How to implement an investment policy, how many investment managers to assign to each asset class, what kind of investment man- agers to select (large/midsize/small capitalization, value/growth/core in- vestment style).
  - *Personnel.* Selection of investment managers for each asset class (Canadian equities, US equities, international or foreign equities, fixed income, etc.). A management structure and the manager selection require a good knowl-edge of the institutional investment market; you need to know the players, their investment process and style, and so on.
  - *Monitoring.* Monitor the investment performance of each manager. It re-quires a good knowledge of their style as well as how the markets are per- forming in order to really understand their numbers and be able to explain their performance to clients. You need to know the team players in order to monitor any changes and turnover of people.
  - *Mandates.* Put in place the appropriate paper documents between the pen-sion plan and the investment managers.
  - *Records.* Defined contribution record keeper selection.
  - *Options.* Defined contribution investment options selection.

Quoted from Fred E. Szabo “Actuaries’ survival Guide” Academic Press (2004) p18

# Progression of Responsibilities

## Progression of Responsibilities

**Q** What are typical SOA and CAS career paths and where should successful actuaries or actuarial students be at age 20, 25, 30, 35, 40, 45 in (a) SOA, (b) CAS?

- **Answer** At 20: at school. At 25: junior consultant. At 30: pre-senior consultant. At 35: senior consultant. At 40: advanced senior consultant. At 45: responsible for major clients, line of business, direction, etc.
- **Answer** I don't think there is such a thing as a typical career path. For SOA, actuaries should have a firm client relationship with clients by the time they're 30. At 45, they should be established as client managers, responsible for high-level work and the relationship with clients.
- **Answer** At 25: SOA graduate with the first three or four exams. Then continue to write exams while working and finish before 30. At that age, actuaries should be familiar with the technical concepts and begin to be relatively autonomous in establishing what needs to be done on different projects. At 30, they should be able to review the work of junior students and have their own clients. At 35, they should be senior consultants.

Quoted from Fred E. Szabo "Actuaries' survival Guide" Academic Press (2004) p23 - 24



# Progression of Responsibilities

## Progression of Responsibilities

**Q** What are typical SOA and CAS career paths and where should successful actuaries or actuarial students be at age 20, 25, 30, 35, 40, 45 in (a) SOA, (b) CAS?

- **Answer** At 20: finishing an undergraduate degree in statistics or actuarial sciences and have at least written the exam. At 25: be at about Courses 4 or 5, and have spent one or two years as an actuarial assistant. At 30: have completed all courses and have gathered five to eight years of experience in one or more companies and hold an Assistant Manager's position. At 35: manager or director. At 40: permanent senior position, secure and confident in the position they are holding.
- **Answer** In my opinion, this should be stated in terms of duration from when the first exam is attempted, rather than by age. People get into the field at different ages and different places; they have different average ages upon graduation from college. Thus, it is not uncommon for someone to get their FSA prior to age 25 in the United States, whereas it is less common in Ontario because Ontario students graduate from university when they are between 23 and 24, instead of 21 or 22. I have met people who didn't start taking exams until their 30s because they switched careers. Most students should get their Fellowship about 8 to 10 years after they started taking exams. The average age of new FSAs is usually in the mid-30s, although the SOA wants to reduce the exam travel-time and, indirectly, the average age of new FSAs. They want to do this, but I doubt it will happen.

Quoted from Fred E. Szabo "Actuaries' survival Guide" Academic Press (2004) p23 - 24

# Progression of Responsibilities

## Progression of Responsibilities (continue)

- **Answer** I will cover only the SOA exams. At 20: start the exams if you want to be an actuary. At 25, you should have completed Courses I through 4. During the first few years of your actuarial career, you will be a junior actuarial analyst. At 30, you should at least be an ASA. You will be a senior actuarial analyst or junior consultant. At 35, you should be an FSA or have decided whether you want to continue writing exams. Life consists of more than SOA exams!!! You should be an intermediate consultant. At 40, you should be a senior consultant.
- **Answer** I would like to have finished all of my SOA exams by the age of 24. After a three-year university program, a solid goal is to have passed four exams.
- **Answer** At 20, you should be in university and have started the first two or three exams. At 25, you should ideally have finished your exams and should be waiting for the completion of your PD [professional development] requirement credits. At 30, you should have two or three persons to whom you delegate work and start helping them build their knowledge. At 35, you should focus on networking and meeting people, start bringing clients to your consulting firm and maintain relationships with existing clients. At 40, you should probably be at the peak of your responsibilities.
- **Answer** At 20: actuarial student. At 25: senior actuarial student. At 30: FSA. At 35: Associate Actuary. At 40: Assistant Vice-President. At 45: Assistant Vice-President or Vice-President.
- **Answer** From the SOA point of view: At 20: in university. At 25: starting out, passing exams, gaining experience at an actuarial firm, deciding on insurance versus consulting, SOA versus CAS, is or is close to being an ASA. At 30: is or is close to being an FSA, settling into the actuarial field with preference for insurance or consulting, SOA or CAS. At 35: twelve or more years of experience. Consultant level with expertise in a preferred field. Providing valuable advice to clients on a wide range of client issues, and a good source of intellectual capital for peers.
- **Answer** In my answer, I will focus on a CAS career. At 20: nice to have passed at least one exam. At 25: two years of experience and at least four exams. At 27: five exams. Very good candidates will have access to a managerial position. At 30: will probably be a Fellow by this age-if not, no problem, but focus on finishing the exams. At 30 to 35: outstanding candidates will have access to senior management positions. Over the first ten to fifteen years of an actuary's career, it is not uncommon for a person to have worked for several employers.
- **Answer** I will describe a typical SOA path. At 20: junior staff in consulting firms or insurance companies. At 25: almost a consultant. At 30 and above: senior consultant for clients and relationship manager.

Quoted from Fred E. Szabo "Actuaries' survival Guide" Academic Press (2004) p23 - 24

# Progression of Responsibilities

## Progression of Responsibilities (continue)

- **Answer** I will answer this question from the CAS perspective.
  - *Student.* Typically, at 20, you will still be in university. You will hopefully get some summer work experience, if not working for an insurance company, at least getting some exposure to the office world. You should be planning to write a few actuarial exams while in university to show prospective employers your willingness to write exams, and your capacity for writing them successfully.
  - *Intermediate.* At 25, you should be making the transition from entry-level to intermediate actuary. You should have written several exams by now, including basic ratemaking and reserving (although not necessarily passing them), which will prove invaluable in the new responsibilities being handed to you.
  - *Associate.* At 30, you should be an Associate, even a Fellow if you are one of the more gifted. This is the point in your actuarial career where you are handed management responsibilities. Although everyone wants to be a manager, very few understand what is involved. If working for a good company, the actuary will have been sent to some form of management and other business-training seminar. But the very motivated individuals will not rely on the company, and will read up on these subjects at home.
  - *Vice-President.* At 35, most CAS Fellows are Vice-President or its equivalent such as partner in a consulting firm (at least, in Canada). Responsibilities start shifting from the pure actuarial areas to the areas of company management and client management.
  - *Career Peak.* At 40 and 45, your level of responsibilities will slowly increase, but essentially, things will remain the same until retirement.
- **Answer** I cannot respond with respect to the CAS, so the answers below are with respect to the SOA.
  - *College.* At 20: taking college courses towards a mathematics degree or actuarial degree. Investigating internship opportunities. Planning to take one or two exams before graduation.
  - *Work.* At 25: working at a company with one to three years of experience. Have passed two or more exams.
  - *Almost FSA.* At 30: working for a company with 5 to 8 years experience. Be close to attaining FSA if not already an FSA.
  - *FSA.* At 35: have the FSA designation, have 10 to 13 years of experience, have a staff working for you, have a more prominent position and be out of the "rotational" student program. Know your specific area of interest or track the one you want to pursue in depth.
  - *Leadership.* At 40 to 45: have a significant leadership role within the company and a staff working with you. Be accessible to newer students in the program who want advice.

Quoted from Fred E. Szabo "Actuaries' survival Guide" Academic Press (2004) p26

# Progression of Responsibilities

## Progression of Responsibilities (continue)

- **Answer** In my answer, I will focus on a CAS career. At 20: nice to have passed at least one exam. At 25: two years of experience and at least four exams. At 27: five exams. Very good candidates will have access to a managerial position. At 30: will probably be a Fellow by this age-if not, no problem, but focus on finishing the exams. At 30 to 35: outstanding candidates will have access to senior management positions. Over the first ten to fifteen years of an actuary's career, it is not uncommon for a person to have worked for several employers.
- **Answer** I will describe a typical SOA path. At 20: junior staff in consulting firms or insurance companies. At 25: almost a consultant. At 30 and above: senior consultant for clients and relationship manager.
- **Answer** Here is a typical CAS career path:
  - *School.* At 20, students are still in school, completing their Bachelor's degree (or Master's degree, even though it is not required in the actuarial field). While in school, students generally start taking actuarial exams. A successful student should have passed the first two exams before graduation and should have had at least two internships related to the actuarial profession or insurance industry.
  - *Analyst.* At 25, students should have a year or two of experience and be well established as an actuarial analyst. At that point, a successful student would have passed 5 or 6 actuarial exams.
  - *Almost Fellow.* At 30, actuaries have typically been exposed to various aspects of the actuarial profession and have expanded their experience to pricing and reserving different lines of insurance. They also have analysts reporting to them and should be close to obtaining their Fellowship (if not done already).
  - *Vice-President.* By 35, actuaries should definitely have their Fellowship and be in a management position (either as a senior consultant in a consulting firm or a Vice-President, or Assistant Vice-President, in an insurance company).
  - *Partner.* At 40, a successful actuary would be a partner in a consulting firm or an officer in an insurance company.
  - *Retired.* At 45, a very successful actuary would retire.
- **Answer** At 20: in university. At 25: actuarial student, 35 hours per week on the job and 40 hours per week studying. At 30: new Fellow, supervisor or manager of a few actuarial students and clerks, or a highly technical position without direct reports. At 35 and above: continually increasing responsibility, demonstrated by increased staff and budget or required technical knowledge.

# Skills

## Mathematical Skills

**Q What general mathematical competencies are required by an actuary? Give some examples and relate them to the SOA or CAS examinations.**

- **Answer** Problem-solving, but this has nothing to do with any university course or actuarial exam.
- **Answer** Calculus is needed for the first actuarial exam. Financial mathematics is very useful in the day-to-day work as well as for the exams (tested on more than one exam). The whole of actuarial theory is based on statistics, so it is, of course, a required competency.
- **Answer** For the first exam, you need a lot of basic probability and calculus competency. The second exam is more about financial mathematics, macro- and microeconomics, and finance. The general mathematical competencies re-quired for this exam are mostly integrals and derivatives. After that, you will always be using a variety of mathematical competencies (again basic probability, integrals and derivatives), but they will become more specific.
- **Answer** Course 1 deals with basic probability and calculus competencies. An ability to deal with them and apply them to actuarial problems is crucial. In general, a deep understanding and competency in probability and statistics is essential to passing SOA and CAS examinations since they are the foundation of actuarial mathematics. A strong background in statistics is necessary.
- **Answer** Knowledge of probabilities and statistical distributions, life contingencies, theory of interest, calculus, geometric series. The calculus is often tested via continuous distribution functions where integration of a function is required (Course 1). Probabilities of people living and dying are combined with geometric series to create the mathematics of insurance and annuities (Course 3). The theory of interest is used for the principles of interest discounting and accumulation (Course 2).
- **Answer** Theory of interest, life contingencies.

Quoted from Fred E. Szabo "Actuaries' survival Guide" Academic Press (2004) p26 - 27

# Skills

## Mathematical Skills (continue)

- **Answer** Theory of interest is a must (time value of money). Probabilities are also very important.
- **Answer** Well, everything that's mathematical in the exam syllabus. Plain and simple!
- **Answer** Competency in calculus, statistics, algebra, probability is essential, especially for the early exams.
- **Answer** Actuarial mathematics such as life expectancies, survival models and projections, annuity factors--regression analysis--e.g., calculating trends, building models, etc.  
Calculus: background used in most programs and models.  
Statistics: always needed to calculate averages, medians, quartiles, etc.
- **Answer** This is a difficult question. The answer also depends on the level of sophistication reached in the various companies. *PIC* companies in Canada are small and not a lot of complex mathematical models are built. I know of one or two companies working on that front, and they have hired a person with a Master's degree in statistics to do the work. However, these people are supervised by actuaries. Advance knowledge of calculus, statistics, theory of interest, life contingencies, and loss distributions are generally required to pass the first four exams. Past that point, at least on the *PIC* side, mathematical competency almost boils down to being able to add and multiply. Basic knowledge of the above is all that is required. And as I said, I find the same is true for our day-to-day life at work.
- **Answer** CAS: only basic mathematical competencies are required. Regression and modeling may be beneficial, but are not a must. It is a common mistake to believe that extensive knowledge of mathematics is required to be an actuary. However, one must like to work with numbers to enjoy being an actuary.
- **Answer** Basic mathematical skills needed. The examinations helpful for a career are the ones that discuss the different methods for valuing liabilities, accounting, and finance.
- **Answer** Calculus, probability and statistics.

Quoted from Fred E. Szabo "Actuaries' survival Guide" Academic Press (2004) p28 - 29

# Skills

## Theory of Interest

**Q Why do actuaries need the theory of interest? Please give examples and relate them to the SOA or CAS examinations.**

- **Answer** Very important for what I am doing, time value of money is a key concept, actuarial present values, rate of return formulas, amortization tables, etc., are all concepts that I have to play with very often in my work even if the way I work with them is different from an examination in Course 2, for example. Excel is used a lot in playing with these concepts.
- **Answer** This is the basic element of the calculation of today's value of any future payment of one dollar. It is the cornerstone of our field.
- **Answer** It is essential for the calculation of annuities and the understanding of the time value of money. For example, we use it when we calculate things payable at retirement with money accumulated today, or when we want to know what is the value of a pension fund today considering what the membership of the fund might be in the future. Again, it is tested directly in one of the first exams and comes back indirectly in the others.
- **Answer** When dealing with a client, we are looking at the overall result of the company, and this includes investment income, future claims, future revenues, etc. The theory of interest is crucial when it comes the time to take those amounts into consideration. It would not be right to use an amount that will be obtained in 10 years, and this is where discounting comes in. The whole point of theory of interest is to calculate the company's financial situation at a certain point in time.
- **Answer** Similar to the previous question, virtually every business problem the life actuary deals with involves the assessment of risk, i.e., the value of a future event contingent on assumed probabilities. The present value of a future event requires the application of the theory of interest.
- **Answer** Theory of interest is the basic of many actuarial mathematics and finance concepts. This material teaches you the value of money in the time. This has many applications in the every day and in the work life. It is also a big part of the second exam.
- **Answer** Present value of annuities.
- **Answer** The theory of interest is needed to understand the basics of actuarial mathematics. The simple concepts of Present Value and Annuities are present, introduced and explained in details in theory of interest, and are everywhere in actuarial science. In Course 2, these skills are tested.

Quoted from Fred E. Szabo "Actuaries' survival Guide" Academic Press (2004) p33 - 34

# Skills

## Theory of Interest (continue)

- **Answer** Time value of money (i.e., accumulation and discounting) and understanding the basic structure of a bond are very important for calculating reserves, premiums. They are crucial for asset-liability management. Courses 2 through 8 use these concepts.
- **Answer** Basis for discounting future value of loss, benefits, etc. Also used in projecting figures in the future.
- **Answer** That is *the* required course. If you don't understand this one, you may as well forget an actuarial career.
- **Answer** The theory of interest is crucial. The time value of money is one of the underlying principles of the insurance industry, only insurance takes it one step further by applying statistics.
- **Answer** Probably not all that necessary now that most work is done on computers using interest vectors.
- **Answer** The theory of interest is one of the essential building blocks of actuarial mathematics. It is needed to define present and future values, for example. Concepts such as calculating present values of bonds and calculating loan payments and outstanding mortgage values involve the theory of interest.
- **Answer** Actuaries in property and casualty insurance are constantly discounting future streams of payments to calculate present values. They also need to understand annuities since they are sometimes used in the claims settlement process. Beyond this, it is not being used too much.
- **Answer** In pension, the theory of interest is an important subject. The payment stream after retirement is based on mortality and interest. It is also needed to project ahead or discount employee contributions.
- **Answer** Interest theory and time value of money are extremely important in any investment-product context (Course 2 of the SOA exams). Reviewing cash flows, profitability, and understanding gain/loss scenarios all hinge on the theory of interest. It is particularly important for actuaries in the investment field.
- **Answer** CAS only: present and future value calculations (investment of insurance funds and discounting of loss reserves). Some annuity calculations.
- **Answer** For valuating pension plans we need the concept of present value.
- **Answer** Calculation of present value of future stream of payments.



# Skills

## Mathematics of Finance

**Q** Why do actuaries need the mathematics of finance? Please give examples and relate them to the SOA or CAS examinations.

- **Answer** Finance is a big part of second exam.
- **Answer** Mathematics of finance is also needed to understand the basics of actuarial mathematics. In Course 2, an extensive and deep understanding of finance is needed. This knowledge and skill will also be used in the work- place. Often, an actuary will be asked to do some financial analysis. A good basis in mathematics of finance is necessary for a good actuary.
- **Answer** Actuaries need to understand assets as well as liabilities in order to properly set reserves and premium and dividend rates. Actuaries now need to understand both sides of the balance sheet to do their job correctly. Courses 5 through 8 (SOA) really hit on this.
- **Answer** Needed when working on the asset side of a pension plan.
- **Answer** The Course 2 exam. Also, insurance products relate very closely to the time value of money and finance.
- **Answer** Financial mathematics is used when valuing pension assets. Also, a basic knowledge of financial markets is always useful when dealing with clients and in devising models. Investors and their advisors are becoming more and more informed, leading to more sophisticated market developments, products and services. As an actuary, and in most cases, at least indirectly affected by financial markets, a basic knowledge of financial mathematics is highly recommended. Course 6 of the SOA examinations is almost entirely based on financial mathematics. Although probably more technical than most actuaries will ever need, it provides an excellent base.
- **Answer** More and more actuaries are getting involved in the investment side of the business, particularly with DCAT [Dynamic capital adequacy testing]. Although not everyone will use it, it is a good idea to be familiar with it in order to be a well-rounded actuary. Theory around cash flow and duration matching are also in common use. I believe this is now being covered in the CAS Course 8.
- **Answer** In pension, you have the promises made to a participant to receive a pension, but you also have the employee and employer contribution that make up the assets. You need to know about investment.
- **Answer** CAS only: finance is not used *per se* in our day-to-day work. However, knowledge about the effects of diversification may prove to be useful with respect to *planned growth* in *PIC*. This would relate to actuaries who have a more strategic role-at the executive level, or close to that level. Knowledge about the risks related to various investments (bonds, stocks, etc.) may prove to be useful in discussions at a higher level (executive level). Generally, knowledge about finance is very good to have, although the actual use of it is limited in the day-to-day work. No link with exams.
- **Answer** Finance related to good consulting when valuating liabilities.
- **Answer** Investment science.

Quoted from Fred E. Szabo "Actuaries' survival Guide" Academic Press (2004) p34 - 35

# Skills

## Economics

**Q Why do actuaries need economics? Please give examples and relate them to the SOA or CAS examinations.**

- **Answer** Great background to have for working in retirement or asset consulting so you understand more of what is going on *in the real world*. The only thing sometimes is that economics is a very theoretical science. Sometimes it is difficult to see a real-world application to some theories seen in Course 2, for example.
- **Answer** To understand the link between the liabilities of a plan and the assets underlying the plan.
- **Answer** A lot of our work depends on finance. For example, with the market situation today, pension funds are losing money. This fact should guide actuaries when they give advice to their clients on when to file an evaluation or the decision to improve the plan, for example. It is tested in the examinations in Courses 2 and 3.
- **Answer** Economics is a big part of the second exam.
- **Answer** Economics are also needed to understand the basics of actuarial mathematics. In Course 2, competency in economics is tested. This knowledge and skill will also be used in the workplace and serve to understand the ways a company and the market work.
- **Answer** Actuaries need to be able to understand the structure and the workings of the different investment markets in order to manage their assets that back their liabilities well. Course 2 and Courses 5 through 8 touch on this.
- **Answer** Set appropriate economic assumptions for actuarial valuation: discount rate, rate of return on assets, etc.
- **Answer** The thing I remember about my economics class is the *marginal cost* theory, which I apply very often. But I'm not sure if I needed this class.
- **Answer** Course 2. Also, the ideas of balance sheets are crucial even for pension plans and for the reserves of an insurance company. Pension actuaries must weigh the assets and liabilities of a pension plan against each other.
- **Answer** Actuaries should have some idea of how macroeconomic events in the economy may affect the sectors of the economy that have an impact on their business. For example, how will a slowdown in inflation affect long-term interest rates?

Quoted from Fred E. Szabo "Actuaries' survival Guide" Academic Press (2004) p34 - 35

# Skills

## Risk Theory

**Q Why do actuaries need risk theory? Please give examples and relate them to the SOA or CAS examinations.**

- **Answer** Risk theory helps me understand the foundation of actuarial science. It is very important, I think, to be strong in this technical area since the ideas involved come up on a daily basis.
- **Answer** Basic to our job is managing the risk related to a plan.
- **Answer** I rarely use risk theory at my level. But it is important for the examinations.
- **Answer** Course 3 tests these skills.
- **Answer** Actuaries are trained to put a value on risk and handle future contingent events. Risk theory is the real fundamental bridge between life contingency theory and the business of insurance. Courses 3, 5, and 8.
- **Answer** Understand risks, model risks to eventually put a value and cost on it.
- **Answer** Risk theory is the heart of actuarial work. An actuary is an expert in the assessment and management of risk.
- **Answer** Risk theory is the basic building block of the *PIC* business. However, as indicated earlier, the level of sophistication is rather lacking in the Canadian marketplace. However, it is helpful to understand risk theory in order to perform the daily work of a *PIC* actuary.
- **Answer** CAS only: This is the basis of the pricing work in *PIC*. I cannot say, however, that what I learned in school with respect to risk theory helped me in my work.

Quoted from Fred E. Szabo "Actuaries' survival Guide" Academic Press (2004) p38

# Skills

## Loss Modeling

**Q Why do actuaries need loss modeling? Please give examples and relate them to the SOA or CAS examinations.**

- **Answer** I guess it is very important in CAS, but is less important in fields such as asset consulting.
- **Answer** I am not yet familiar with loss modeling.
- **Answer** I think this is more of a CAS thing or perhaps also a reinsurance thing.
- You need to be able to calculate the probabilities of incurring a loss before you can accurately set a price for an insurance premium. Loss modeling comes up in Course 4.
- **Answer** CAS stuff. Used in pricing products by modeling future expected losses. Needed since non-life risks generally have the following characteristics: time of event unknown (so need a frequency distribution) and size of loss unknown (so you need a loss distribution).
- **Answer** More useful for CAS, I think.
- **Answer** Loss modeling is a fairly useful tool that is hardly ever used, at least in my experience. Lack of size (and therefore lack of data) is one of the problems encountered when trying to do loss modeling. Often a lack of time and resources will also force a company to use a broad-brush approach in its pricing and reserving modeling.
- **Answer** CAS only: loss modeling may be used to forecast the severity of certain events, and also to determine how variable results will be from one even to the next (link with credibility of results). For example, in looking at auto- mobile theft, vandalism and fire, loss modeling may be used to determine the shape of the curve that best describes severity (average cost). Once this is done, one can determine how variable this severity will be, and therefore how many observations are required in order to get credible estimates.

Quoted from Fred E. Szabo "Actuaries' survival Guide" Academic Press (2004) p39

# Skills

## Stochastic Ideas

**Q What stochastic ideas and techniques do actuaries use? Please give examples and relate them to the SOA or CAS examinations.**

- **Answer** I know areas of the actuarial field where it is extensively used and is important. This is not yet the case in asset consulting (at my level). But I know that stochastic ideas are very important in asset and liabilities management, an area I would love to get into later on in my career.
- **Answer** The only method used frequently is the Monte Carlo simulation, mostly for the projection of the assets of the plan.
- **Answer** Continuous Markov chains are used by actuaries and are tested in Course 3, I believe.
- **Answer** Becoming more prevalent, especially with modeling possible future interest rate patterns when determining reserve amounts for life insurance and annuities. Also used for sensitivity testing and pricing of minimum guaranteed death benefits for segregated funds. Course 8 had a big section on this. Course 7 Pre-test had this.
- **Answer** Projections of pension plan assets or surplus based on stochastic distribution of future interest rates. Can then determine the future distribution of values by percentile, calculate the probability of having a value less than some fixed amount, etc.
- **Answer** To forecast what are best and worst case scenarios under different sets of hypotheses for surplus or deficit in a pension plan.
- **Answer** Stochastic modeling of the cost of face amount guarantees on segregated funds.
- **Answer** CAS only: stochastic techniques are not widely used in Canada. They may be used in the area of DCAT [dynamic capital adequacy testing], although I do not know anyone who has programmed or is using a stochastic model in Canada to do DCATs.
- **Answer** More in asset consulting than liability consulting.

Quoted from Fred E. Szabo "Actuaries' survival Guide" Academic Press (2004) p39 - 40

# Skills

## Software Skills

### Q What software skills should actuaries have and why? Please give examples.

- **Answer** All Microsoft Office tools (especially Microsoft Excel), databases (of- ten firms have their own database system that is learned on the job), and logic. Knowledge of time management software is a must to effectively manage time in and out of the office!
- **Answer** Skills are more related to problem-solving approach than real program-ming skills.
- **Answer** Knowing all Microsoft tools such as Word, PowerPoint, Excel, etc., well. Being comfortable with searching for information on the Internet.
- **Answer** Actuaries mostly use Microsoft Excel and should feel comfortable us-ing it. Since we are playing with numbers all day long, any software that performs similar operations can be used.
- **Answer** Programming skills are needed. Also, Microsoft Excel is a commonly used tool and the actuary should be very comfortable with using formulas and editing data. Sometimes Microsoft Access is used for data modification or verification.
- **Answer** Strong Microsoft Excel skills are required, I think, in every company.
- **Answer** Microsoft Excel, Access and Visual Basic programming.
- **Answer** Microsoft Excel is a definite must. It is used in the day-to-day routine of an actuary. An actuary should also have good computer programming skills and be comfortable with the Internet. Like in many careers, the computer is one of the basic tools of the actuary.
- **Answer** Actuaries should have good Microsoft Office skills, especially Excel, Access and Word. They should have strong programming skills as well. Entry-level jobs, in particular, require good software skills.
  - *E-mail.* Capacity to use e-mail (obvious, I guess).
  - *Excel.* Capacity to use Excel (most of the calculations are done in Excel).
  - *Word.* Word processing: to write memos/documents (speed of typing is important). To be an actuary, one must like computers because about 90% to 95% of the work hours are spent on a computer.
- **Answer** Good in Microsoft Excel, Word, and Access.
  - *Excel.* Advanced knowledge of Excel is required since most companies use Excel to put together actuarial analyses.
  - *Access.* At least intermediate knowledge of Access is required. The actuary who is able to run complex queries will generate better data as a basis for actuarial analyses.
  - *Word.* Basic knowledge of Word is required to convey results and findings of actuarial analyses.
  - *PowerPoint.* Basic knowledge of PowerPoint is required to prepare presen-tations to management or clients.

Quoted from Fred E. Szabo "Actuaries' survival Guide" Academic Press (2004) p44

# Skills

## Programing Skills

**Q Which programming languages do actuaries need and why?  
Please give examples.**

- **Answer** Rarely. I need to write macros in Excel. That is about it.
- **Answer** None. All companies have their own software now.
- **Answer** Usually, each actuarial firm has its own program, so I don't think there is some particular programming languages needed. Of course, Microsoft Excel and Visual Basic are used a lot. I would say that an actuary should know at least one of the common programming languages (Fortran, C++, etc.). With that knowledge, it should be enough to adapt to others.
- **Answer** In my day-to-day work, I use Microsoft Visual Basic (for macros) from time to time. Besides that, it is mostly company-specific programs. Therefore, more than knowing a single language inside out, I believe it is more important to have a strong understanding of programming methodology.
- **Answer** I used SAS in a casualty insurance company and in government, and Microsoft Visual Basic in all of my internships. Although I took C++ courses at university, I have never used this programming language.
- **Answer** I don't use any language, but the logic behind it is used for company-specialized software for actuarial valuations.
- **Answer** Microsoft Visual Basic and Visual Basic for Applications are often used in the field. Knowing how to program macros and use them is often a great advantage. APL, although now more and more scarce, is also a programming language that has benefits since it is still used in some insurance companies.

Quoted from Fred E. Szabo "Actuaries' survival Guide" Academic Press (2004) p45

# Skills

## Business Skills

It is often said that good business skills are essential to succeed in the actuarial world. What are business skills? Many companies now specialize in the teaching of business skills. Let us take a look at a typical repertoire of one of these companies. The company *Learn<sub>2</sub>*, for example, offers business skills courses which include:

- Appraising people and performance
- Articulating a vision
- Coaching and counseling
- Communication skills
- Conflict resolution
- Counseling and disciplining
- Customer service
- Decision making
- Effective presentations
- Giving clear information
- Interviewing techniques
- Leadership situations
- Planning and scheduling work
- Planning your presentations
- Relationship strategies
- Training, coaching and delegating
- Time management and prioritizing
- Setting goals and standards

Quoted from Fred E. Szabo "Actuaries' survival Guide" Academic Press (2004) p45



# Skills

## Business Skills

**Q What business knowledge and skills do actuaries need and why? Please give examples.**

- **Answer** At a higher level, actuaries sell services to clients. So actuaries need to be good in persuasion, understanding needs, and foresee problems or requests. Honesty is also very important. They need to be aware of the market in general. To understand their clients better, they also need to check specific fields in particular (if your client is a factory, you should know if the market is good for that field, not just for your client or in general). Actuaries also get to manage clients' teams: prices to charge, tasks to perform, who's to work together, time allocated to a project, and so on.
- **Answer** A good background in business is necessary to an actuary. A knowledge of finance is essential in the study of actuarial mathematics, but even skills and knowledge in Marketing and Accounting can be useful since you will often find actuaries in the marketing and assets and liabilities management department of an insurance company. Since actuaries often hold management positions, management skills can be useful.
- **Answer** There are others, but I would start with basic accounting (balance sheet, income statement, double-entry accounting) and finance (investments/assets characteristics).
- **Answer** This depends on the ambition of the person involved. Generally, the more ambitious, the more business knowledge and skills are required. Actuaries who are happy working in the back room and are not interacting with people other than their manager and co-workers probably don't need too many business skills. However, anyone who wants to climb the corporate ladder requires business skills. Indeed, let us not forget that this is what we are doing: running a business. The best actuaries in the field are, first and foremost, businessmen. They can understand the difference between an actuarial indication and the price the market will bear. They understand the implication on the company of their decision with regard to IBNR (incurred but not reported) loss reserves or reinsurance. They get involved in projects and understand the work flow of the organization, the difference between the bells and whistles, and necessary system enhancements. Business skills required include economics, marketing, management (both personal, time, and project), finance, investment, and communication.

Quoted from Fred E. Szabo "Actuaries' survival Guide" Academic Press (2004) p50

# Skills

## Communication Skills

### Q What communication skills do actuaries need and why? Please give examples

- **Answer** The more skilled actuaries are, the better they are, as I have found out since working full-time. Especially in Montreal, being able to speak and communicate fluently in both English and French is a *great* asset. For a junior consultant, it is of the utmost importance to communicate very well with the seniors so we understand exactly the work that needs to be done and once completed, to be able to explain it to the consultant in clear words. Listening is also a forgotten skill, but very important in day-to-day work. Presentation skills become more and more important, I assume, as you grow in the business and have to meet with clients and present them ideas and reports. Being able to support your ideas and organizing your thoughts are also key skills.
- **Answer** Clarity, since it is difficult. Simplicity, since the client must understand.
- **Answer** Knowing at least two languages, enough to be able to communicate, is essential. It is not unusual to encounter French-speaking clients, for example. Canada is so bilingual that it's not an option anymore. Also, an actuary needs to be able to express his thoughts and his knowledge. It will happen often that a more advanced actuary needs to explain something to a new one or even to a client. So being able to be clear, not too complicated and see when the other person doesn't understand is essential. The same skill applies for writing (the annual statements, for example, need to be clear, but simple).
- **Answer** You need verbal skills to give presentations to your colleagues and to clients (particularly in the consulting field). Your writing skills will be useful to write actuarial evaluation reports or prepare internal status documents.
- **Answer** Very good communication skills in order to gain credibility from people we are working with and to explain simply what we have done and why.

Quoted from Fred E. Szabo "Actuaries' survival Guide" Academic Press (2004) p51 - 52

# Skills

## Communication Skills (continue)

- **Answer** Presentation skills are necessary since it is often required from actuaries to present their research results, projects or recommendations. Actuaries must also be able to *sell* an idea. In the consulting business, actuaries will interact with clients and need to be able convince the client of the necessity of a benefit plan for example. Actuaries also sometimes need to explain their results and recommendations. Hence communication skills are, as much as mathematics and business skills, essential in the making of a great actuary.
- **Answer** Verbal: speaking to other actuaries in technical language, speaking to non-actuaries in non-technical language, presenting to management/board on reserves (appointed actuaries), presenting updated pricing models to un-derwriters, leaving phone messages. Written: documenting in clear and understandable language, writing some letters and reports (especially in con-sulting), e-mail. Listening: gathering information, learning about other areas of the company, learning other peoples' terms so you can speak to them in their language.

Quoted from Fred E. Szabo "Actuaries' survival Guide" Academic Press (2004) p51 - 52

# Skills

## Communication Skills (continue)

- **Answer** Written: you often need to write important reports for management and regulators and/or auditors. Internal documentation of processes is needed as well. You also need to use e-mail effectively to communicate with non-actuarial staff, the field force, and customers who need to have technical concepts explained in non-technical language. Verbal: same reasons as above, without the written reports for regulators and auditors. Public speaking: you are often required to make presentations to audiences with varying actuarial knowledge.
- **Answer** You need good writing and verbal skills. Mastering two or more languages is a must.
- **Answer** The biggest challenge is to understand what you are doing and then to be able to explain it to people who don't have an actuarial background. Therefore, it requires excellent communication skills if you don't want to spend your life in front of your computer.
- **Answer** You need to be able to communicate complex actuarial concepts to a variety of audiences and levels of understanding.

Quoted from Fred E. Szabo "Actuaries' survival Guide" Academic Press (2004) p51 - 52

# Skills

## Communication Skills (continue)

- **Answer** Expression. It might often be hard to express a mathematical calculation in words, but this is a necessary ability. When working with a team, it is necessary to be able to discuss one's work and the need for certain calculations. It is important to be able to give oral presentations and to be able to speak in front of a crowd. In a corporation, you must speak in front of a group to share knowledge and ideas.
- **Answer** Verbal and presentation skills to be able to present and *sell* your ideas and concepts to management. This is often critical when you work closely with upper management (such as corporate actuaries).
- **Answer** Depending on the actuarial field, various levels of communication skills are required. For consulting actuaries, communication skills are extremely important. The level of knowledge of clients is quite broad; ranging from clients who are well informed to clients who have only a basic knowledge and depend on consultants to provide them with the required knowledge and information. A consulting actuary must therefore be able to communicate technical information into laymen terms and be able to tailor the information based on the level of knowledge of the clients.
- **Answer** Actuaries need both written and oral communication skills, especially as more responsibilities are assigned to them. Actuarial mathematics is a difficult concept and it is difficult to explain to a lay audience. Furthermore, at least with P/C companies, actuaries interact a lot with marketing, sales, and branch managers. In addition, all corporate actuaries interact with finance and upper management, as well as IT [information technology]. Rarely do actuaries price a product in a vacuum. The actuarial indication is only the beginning of the process. What good is it to price a product at the actuarially sound rate if nobody is going to buy it? Especially if the high price is driven from conservative assumptions. Pricing actuaries often have to explain or sell their recommended increases to a variety of people. When involved in various projects (or business), actuaries are often experts relied upon to help shape the requirements of the project. Good writing skills are essential in these instances. Corporate actuaries often need to explain their IBNR [incurred but not reported] loss reserve calculations to upper management. When a change in IBNR can erase the entire profit for a given year, not only are good communication skills necessary, political savvy is also essential! At a certain level, appointed actuaries also have to report to the Board of Directors. To avoid the "glassy eye" syndrome, good verbal communication skills are again essential.

Quoted from Fred E. Szabo "Actuaries' survival Guide" Academic Press (2004) p51 - 52

# Actuary Around the World

## Australia

- Admission as a Fellow of the Institute of Actuaries of Australia (FIAA) is granted once all five parts of the Institute of Actuaries of Australia's (IAAust) education program are successfully completed: (1) Part I- Technical Subjects. (2) Part II- The Actuarial Control Cycle. (3) Part III-Specialist Subjects. (4) The Practical Experience Requirement. (5) Professionalism Course.
- Part I is made up of nine subjects including statistical modeling, financial mathematics, stochastic modeling, survival models, actuarial mathematics, eco-nomics, finance and financial reporting and financial economics. All nine subjects must be completed.
- Accredited undergraduate actuarial programs and non-award courses are offered by Macquarie University, Sydney, the University of Melbourne, the Australian National University (ANU) in Canberra, and the University of New South Wales (UNSW) in Sydney. Alternatively, these subjects can be studied by corre-spondence through the Institute of Actuaries (London).
- Part II of actuarial education is the actuarial control cycle, which is an innovative means for learning how to apply actuarial skills to business situations across a wide range of traditional and non-traditional practice areas. Developed by the IAAust, this course is taught by four universities in Australia (as men-tioned above). A strong and rigorous policy framework for accreditation of the university courses is in place, so that the IAAust maintains quality control of the teaching and assessment of the courses. After completing Parts I and II, members achieve Associateship of the IAAust (AIAA).
- Part III consists of specialist subjects, of which students must complete two, in life insurance, general insurance, superannuation and planned savings, finance, and investment management. These yearlong courses are developed and managed by the IAAust and are offered by distance education.
- Students must complete 45 full-time working weeks of relevant work experi-ence after having completed Part II. Activities that qualify as relevant experience would include work that makes use of economic, financial and statistical princi-ples to solve practical problems; work that deals with the financial implications of uncertain events.
- The Professionalism Course is a highly participative three-day residen-tial cou-rse conducted by the IAAust. It aims to facilitate knowledge of the obligations, risks and the legal responsibilities of being a member of the actuarial profession.
- The IAAust has concluded a number of bilateral agreements for mutual recognition of Fellows with the Faculty and Institute of Actuaries (UK), the Society of Actuaries, the Canadian Institute of Actuaries, and the Society of Actuaries of Ireland.

Quoted from Fred E. Szabo "Actuaries' survival Guide" Academic Press (2004) p73

# Actuary Around the World

## France

- The education of actuaries in France is university-based. Three universities offer degree programs in actuarial science: Brest, Lyon, and Strasbourg. According to Morgan (*"Love it or hate it"*, The Actuary 2001), "The profession is still underdeveloped compared to the United Kingdom, and France is the only European country where actuaries are not a legally recognized profession." Morgan points out that "as in many European countries, the actuarial profession has been more academic and less practical than that in the United Kingdom, but this is changing as elements of accounting, law, and tax have been added to the course of study. These days, actuaries work in banks and consultancies as well as in insurance companies. In insurance their role is widening to include marketing and communication as well as just technical matters such as ALM [Asset and liability management], and embedded values are starting to become more widespread."

## Germany

- Germany has its own version of professional accreditation. In order to qualify for membership in the *Deutsche Aktuarvereinigung* (Actuarial Association of Germany), candidates must pass examinations testing their general and specific competence in actuarial science. The *Deutsche Aktuarvereinigung* has joined forces with the *Deutsche Gesellschaft für Versicherungsmathematik* (German Society for Insurance Mathematics) and the *Institut der Versicherungsmathematischen Sachverständigen* (Institute of Experts in Insurance Mathematics) and founded the *Deutsche Aktuar-Akademie* (DAA) (German Actuarial Academy), which provides basic and advanced training for actuaries. The DAA holds seminars and workshops for the courses in which actuarial candidates are examined.
- The German accreditation system consists of three levels of examinations, each consisting of several courses. Each level is considered to require one year of preparation. Level 1 consists of three examinations and one compulsory course in data processing. The subjects examined include mathematics of the life insurance, mathematics of finance, and other elementary actuarial topics. Level 2 consists of two examinations, chosen from four topic areas: P/C, pensions and stochastic methods, real estate, and health. Level 3 consists of a compulsory seminar and examination in one of the following specialties: life insurance, P/C, pensions, applications of stochastic methods, health, and finance. Several German universities offer degree programs in actuarial science. Among them are the universities of Ulm and Göttingen.

Quoted from "Actuaries' survival Guide" p73

# Actuary Around the World

## Japan

- The actuarial education is profession-based. The Institute of Actuaries of Japan offers actuarial courses that enable applicants to acquire basic knowledge and to prepare for qualification examinations. Actuarial courses are divided into two categories, basic and advanced courses. The basic courses are intended for students of the Institute, while advanced courses are aimed at persons who have completed the basic subjects.
- To become an Associate member of the Institute, candidates must pass examinations in the following five basic courses:
  1. Probability and statistics.
  2. Basic principles and applications of life insurance mathematics.
  3. Basic principles and applications of non-life insurance mathematics.
  4. Basic principles of pension mathematics and pension finance.
  5. Basic principles of accounting, economics and investment theory. After passing these courses, candidates qualify for Associate membership in the Institute of Actuaries of Japan.



# Actuary Around the World

## Japan

- To become a Fellow of the Institute, Associates must pass two additional advanced courses: (LI1) Life insurance products and development and (LI2) Life insurance accounting, settlements of accounts, or (NLI1) non-life insurance products and development and (NLI2) non-life insurance accounting, settlements of accounts and asset management, or (PI) Tax qualified pension plan scheme and pension-related tax and accounting and (P2) Public pension system and employees' pension fund scheme. Fellowships are approved by the Board of Directors of the Institute. New fellows are also strongly recommended to take a half-day professionalism course.
- The education system of the Institute is under review with the following objectives: broader areas to be examined and the completion of a professionalism course for fellowship will eventually be required.
- Several Japanese universities offer courses on actuarial mathematics and risk management, but there are no exemptions for qualification examinations. In 2001, the membership of the Institute was made up as follows: 958 Fellows (including six honorary members), 772 Associates, and 1667 Students.
- [As of 31. Jan. 2011, 1,254 Fellows, 963 Associates, 2,255 Students, total 4,472.]

Quoted from Fred E. Szabo "Actuaries' survival Guide" Academic Press (2004) p81

# Occupational distribution of Japanese Actuaries

	Life	Trust Bank	Non-Life	Others	Total
Fellow	534	180	171	369	1,254
Associate	404	103	155	301	963
Student	892	153	374	863	2,255
Total	1,830	436	700	1,506	4,472

This is the occupational distribution of the actuaries of Japan. As of 31. Jan. 2011.  
40.9% in the Life business, 15.7% in non-life, 9.7% in trust bank.  
Historically, Life business needs many actuaries.

<http://www.actuaries.jp/actuary/fields.html>

# Role of Japanese Chief Actuary

Article 120 (Appointment of Actuary, etc.)

- (1) The board of directors of an Insurance Company (limited to a Life Insurance Company or a Non-Life Insurance Company meeting the requirements specified by a Cabinet Office Ordinance. The same shall apply in the paragraph (3) and in Article 122) shall appoint an actuary to Participate in the matters prescribed by a Cabinet Office Ordinance as actuarial matters pertaining, among others, to the method of calculating insurance premiums.
- (2) The actuary shall be a person with necessary knowledge and experience with regard to actuarial science who meets the requirements specified by a Cabinet Office Ordinance.
- (3) An Insurance Company shall, when it has appointed an actuary or when its actuary has left his/her office, notify the Prime Minister thereof without delay, pursuant to the provisions of a Cabinet Office Ordinance.

Japanese Insurance Business Law

<http://www.fsa.go.jp/news/19/ginkou/20080627-4/03.pdf>

# Role of Japanese Chief Actuary

## Article 121 (Actuary's Duties)

- (1) The actuary shall, for each accounting period, check the following matters pursuant to the provisions of a Cabinet Office Ordinance and submit to the board of directors a written opinion describing his/her findings:
  - (i) Whether the policy reserve pertaining to the insurance contracts specified by a Cabinet Office Ordinance has been funded according to sound actuarial practice;
  - (ii) Whether policy dividends or dividends of surplus to members have been distributed in a fair and equitable manner; and
  - (iii) Any other matter specified by a Cabinet Office Ordinance.

Japanese Insurance Business Law

<http://www.fsa.go.jp/news/19/ginkou/20080627-4/03.pdf>

# Role of Japanese Chief Actuary

Article 121 (Actuary's Duties) (continue)

- (2) The actuary shall, without delay following the submission to the board of directors of the written opinion set forth in the preceding paragraph, submit a copy of the written opinion to the Prime Minister.
- (3) The Prime Minister may request the actuary to provide explanations about the copy of his/her written opinion set forth in the preceding paragraph and to present an opinion on any other matter in the scope of his/her duties.
- (4) In addition to what is provided for in the preceding three paragraphs, any necessary matter regarding the written opinion set forth in paragraph (1) shall be specified by a Cabinet Office Ordinance.

Japanese Insurance Business Law

<http://www.fsa.go.jp/news/19/ginkou/20080627-4/03.pdf>

# Role of Japanese Chief Actuary

Article 122 (Dismissal of Actuary)

The Prime Minister may order an Insurance Company to dismiss its actuary, when the latter has violated any provision of this Act or any measures of the Prime Minister under this Act.

Japanese Insurance Business Law

<http://www.fsa.go.jp/news/19/ginkou/20080627-4/03.pdf>

# Actuary Around World

## Korea

- To be the assistant actuary, the student has to pass the 4 exam. After that, passing the three professional exams, he'll be a candidate to be fellow. For being the fellow, it is required to finish two years' practical experience in the financial institute, or half years' experience and the submitting the qualified article.
- The detail of the subjects are presented in the following sheets. One of the distinctive subjects is the Language. The applicant has to choice English or Japanese.
- From 2014, the Korean examination system will be changed. The subjects will have much more risk management items.
- Following table shows the number of fellows and assistant actuaries in Korea. (as of June 2012)

<b>Total</b>	<b>1,327</b>
Fellow	820
Assistant Actuary	507

## Actuarial Exam in Korea

<b>First stage</b>	<b>9:00 ~ 10:20 (80 minute)</b>	<b>10:50 ~ 12:40 (110 minute)</b>	
<b>Subject 1</b>	Insurance Law (contract and business law)	Language (English or Japanese)	
<b>Subject 2</b>	Economics or Business science	Insurance Math. (Basic Life Ins. Math., calculus and probability)	
<b>Second stage</b>	<b>9:00 ~ 10:40</b>	<b>11:00 ~ 12:40</b>	<b>13:40 ~ 15:40</b>
	Insurance Theory	Accounting	Actuarial Math

1. The pass mark of the each subject of the first stage is 40, however the average of the paired subjects shall be over 60.
2. For the second stage, the pass mark is also 40 for each subject, however, the examination committee decides the number of the successful applicants. This number varies every year. In the past, the number was 10 to 20, but recently this number is over 100.
3. After the second stage, two years' business experience (OJT), or half years' business experience and submitting a study paper, the applicant will be a fellow of the Korean actuary.
4. There is two years limited period to success the second stage, the candidate has to pass all subjects of second stage within two years.

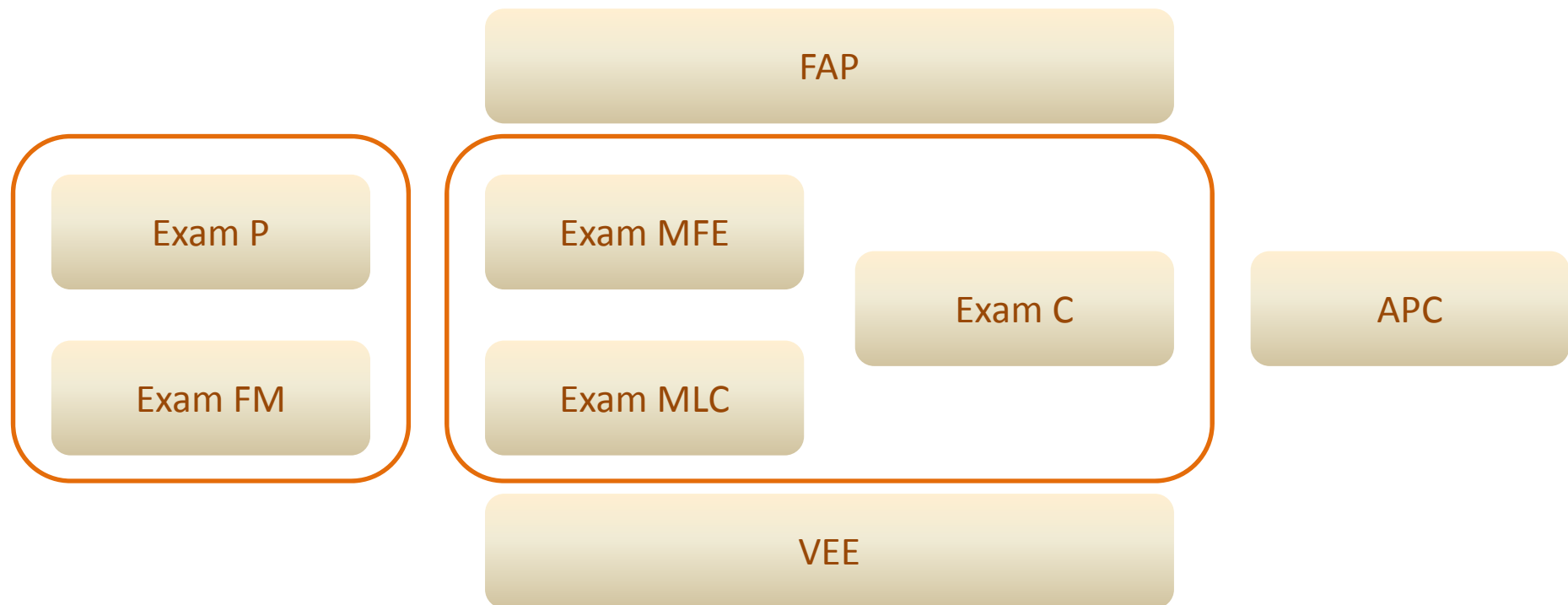


## Actuarial Exam in Korea

	Up to 2013	From 2014
<b>First stage</b>	1 Economics or Business science 2 Insurance Math. 3 Language 4 Insurance related Laws	1 Economics 2 Insurance Math. 3 English 4 Law (Insurance contract, Insurance Business and workers' retirement benefit law) 5 Accounting
<b>Second stage</b>	1 Insurance theory 2 Accounting 3 Actuarial Math	1 Actuarial risk management 2 Actuarial Math. 3 Pension Math. 4 Actuarial modeling 5 Corporate finance and financial technology

1. Expand the Exam to the risk management and finance
2. The sufficient mark of TOEIC or TOEFL is substitute for Exam of English
3. There is five years restriction period to pass the second stage, the candidate has to complete all subjects of second stage within five years.
4. To be a fellow, it is requested business experience.

## ASA Pathway to Membership



Exam P : Probability

Exam FM : Financial Mathematics

Exam MFE : Actuarial Models – Financial Economics

Exam MLC : Actuarial Models – Life Contingencies

Exam C : Construction and Evaluation of Actuarial Model

FAP : Fundamentals of Actuarial Practice

VEE : Validation by Educational Experience

APC : Associateship Professionalism Course

## FSA Pathway to Membership

When you are ready to take the Fellowship-level requirements, you must select a specialty track and complete all requirements in the track (Mixing requirements from different tracks is not permitted.). The SOA offers six specialty tracks.

Corporate  
Finance and  
ERM

Individual  
Life and  
Annuities

Group and  
Health

Quantitative  
Finance and  
Investment

Retirement  
Benefits

General  
Insurance

## FSA Pathway to Membership

### Ex. Individual Life and Annuities

Regulation and Taxation Module

Enterprise Risk Management (ERM)  
Module

Financial Economic Modules

Life Pricing Exam

Life Finance and Valuation Exam

Life Risk Management Exam or ERM Exam

DMAC  
The Decision Making and  
Communication

FAC  
Fellowship Admission Course

# CERA

## Changing the conversation around risk

Risk has changed. So, too, has the kind of professional best qualified to manage it.

The most comprehensive and rigorous demonstration of enterprise risk expertise available, the Chartered Enterprise Risk Analyst® (CERA) is a professional who blends the quantitative and the qualitative—who thinks critically, creatively and collectively about risk, and acts with integrity.

Building upon a rich history and standard of excellence, the CERA credential from the Society of Actuaries CERA reflects the actuary's evolution—from helping the world better understand risk to playing a leading role in an organization's risk management. Today, CERAs are changing the conversation around risk—speaking not merely to what we can lose, but to what we can gain.

No other type of risk professional is better equipped to take a 360-degree approach to risk, to drive better decision-making and optimize risk enterprise wide.

- See more at: <http://www.ceranalyst.org/index.asp#sthash.tFqATDEd.dpuf>
- <http://www.ceranalyst.org/index.asp>

# CERA Pathway to Membership

FAP

Exam P

Exam MFE

ERM Module

ERM Exam

Exam FM

Exam C

APC

VEE

## About the salary survey

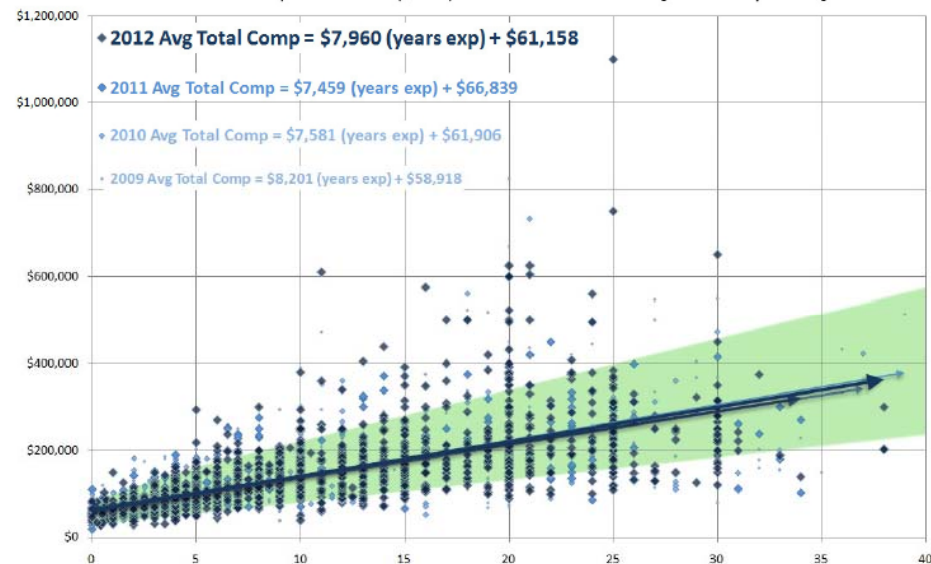


# DW SIMPSON

## 2012 SALARY SURVEY

### Actuarial Salaries vs. Years Experience

Total Compensation (\$US) = Base + Bonus [All Disciplines]



**MOST PLACEMENTS = MOST DATA = MOST TRUSTED**

**[dwsimpson.com/salary](http://dwsimpson.com/salary)**

## About the salary survey



Survey in USDS (000) 10<sup>th</sup> - 90<sup>th</sup> percentile [Base Salary + Paid Bonus] - Updated October 2012

<i>Life &amp; Health October 2012</i>	0-0.5 yrs	0.5 - 2.5 yrs	2.5 - 4.5 yrs	4.5 - 6.5 yrs	6.5 - 9.5 yrs	9.5 - 14.5 yrs	14.5 - 19.5 yrs	19.5+ yrs
<b>1 exam</b>	50-58	54-69	55-72					
<b>2 exams</b>	54-64	55-75	60-80	66-86				
<b>3 exams</b>	56-69	58-81	64-87	70-93				
<b>4 exams</b>	60-74	62-89	65-93	72-101	75-110			
<b>4 exams + FAP 1</b>		66-92	68-101	76-111	82-122			
<b>ASA</b>		72-101	77-114	84-128	95-144	96-160	110-234	121-244+
<b>FSA</b>			97-146	104-158	118-198	131-245	148-348	163-403+

<http://www.actuaryjobs.com/>



# Summary

1. Mathematics and Statistics is important
2. The daily life of an actuary is so called “bread-and-butter.”
3. PC skill, especially the Microsoft Excel, Excel VBA, Word, Access and PPT are essential.
4. Programing languages are also important.
5. Patience and hard work are the key to success.

Thank you for  
your attention