Fundamentals of Actuarial Practice (FAP)
Descriptions and Objectives
Module 1: Introduction/Role of the Professional Actuary

FAP Introduction: Course Overview

Description:
FAP encompasses real-world applications and uses examples to demonstrate actuarial principles and practices. Practical techniques are presented to assist in your day-to-day work. You will also have opportunities to apply these principles and techniques in traditional and non-traditional actuarial practice areas. With the fundamentals in your toolkit, you will be better prepared to apply your learning to new areas of practice that may emerge during the course of your actuarial career.

FAP design and delivery supports your learning by:
- Introducing you to financial security systems, common actuarial techniques, and practical experiences.
- Describing actuarial practices, principles, approaches, methods, commonalities, problems, and solutions.
- Explaining actuarial practices across the traditional areas of practice:
  - Life insurance
  - Property and casualty insurance
  - Health insurance
  - Retirement benefits
- Explaining actuarial practices as applied directly on behalf of financial security system providers or as a consultant to those providers.
- Preparing you to apply actuarial skills in nontraditional and emerging areas of practice.
- Providing context for the specific mathematical and technical skills tested in the Preliminary Education examinations, some of which you may have already taken, others of which you might be studying for now:
  - Probability
  - Financial Mathematics
  - Investment and Financial Markets
  - Statistics for Risk Management
  - Long-Term Mathematics
  - Short-Term Actuarial Mathematics
  - Statistics for Risk Modeling
  - Predictive Analytics
- Helping you prepare for your professional role as an Associate of the Society of Actuaries (ASA).

Objectives:
- What are financial security systems? How do they operate?
- What issues do actuaries address? What is the actuary’s role?
- How does the business environment affect the work of actuaries?
- How is actuarial practice expanding to fill newly developing roles?
- How do actuaries bring professionalism to their work?
- What types of problems do actuaries solve?
- What is risk in an actuarial context?
- How do actuaries identify, assess and manage risk?
- How do actuaries apply the fundamental concepts of actuarial science in their work?
What solutions do actuaries bring to their bosses, management, boards of directors or clients?
How can you articulate answers to each of these questions to a non-expert audience?

Successful completion of the FAP course will enable you to answer these questions.

Section 1: Module Overview
Description:
This section introduces the overall goals and purposes of Module 1: Role of the Professional Actuary. You will be introduced to the profession, to traditional and nontraditional areas of actuarial practice, to the positions actuaries hold, and to their contributions as volunteers.

Objectives:
After you complete this section, you will be able to:
• Explain what actuaries are.
• Describe what actuaries do.
• Explain how actuaries practice.
• Explain how actuaries work in a global context.
• Explain how the Control Cycle facilitates actuarial work.

Section 2: The Actuary
Description:
The purpose of Section 2: The Actuary is to provide a brief history of the profession, to consider the future of the actuarial profession, to explore the role of today’s actuary, to detail the actuary’s skill sets and to review the profession’s codes of conduct.

Objectives:
After you complete this section, you will be able to:
• Describe important historical events influencing the actuarial profession.
• Describe today’s actuarial practice.
• Define “actuary.”
• Identify the actuary’s knowledge, skills, and abilities.
• Describe what an actuary contributes as a professional.
• Describe actuarial codes of conduct.

Section 3: What Actuaries Do
Description:
The purpose of Section 3: What Actuaries Do is to explore the varied definitions of risk and identify how to define it in context, to consider how financial security systems function to manage and reduce risk, to introduce and investigate the areas of practice in which actuaries work, to investigate how actuaries manage risk, and to look at the services actuaries provide.
Objectives:
After you complete this section, you will be able to:

• Define risk.
• Explain how financial security systems interact to combat financial insecurity.
• Describe the actuary’s contributions within each area of practice.
• Explain ways in which actuaries manage risk.
• Identify services actuaries provide for financial security systems.

Section 4: External Forces
Description:
In the previous sections, we reviewed how professionalism surrounds the Control Cycle. Professional codes of conduct and standards govern all actuarial work, emphasizing the fact that an actuary is an expert employing a well-defined body of knowledge. An actuarial designation provides you with instant credibility.

To maintain your expert status in your practice area, however, you must stay current. You must always be aware of emerging issues in the profession and in your clients’ lines of business. You must be aware of new advances in technology and how these advances may affect your work. You must assume the responsibility for continuing your education through formal offerings as well as informally through personal reading, for example.

Your clients will assume that, as a professional, you are always up-to-date on the external factors that affect their business as well as the actuarial profession. External factors not only affect the work you will do as an actuary, they also affect how the actuarial profession conducts its business. A practicing actuary does not work in a vacuum. External forces influence how the actuary works today and will work in the future. External forces can be thought of as forces that affect the problem or its solution. Further, changes in external forces may affect an existing solution and become apparent as an actuary monitors the results of a solution.

Objectives:
After you complete this section, you will be able to:

• List external forces that affect business
• Describe the elements of the Control Cycle.
• Explain how the Control Cycle facilitates actuarial work.
• Apply the Control Cycle in the context of an actuarial problem.

Section 5: The Control Cycle
Description:
You’ve been introduced to the Control Cycle as a framework for solving actuarial problems. You’ve learned that professionalism underlies the Control Cycle, while external forces, though generally outside of the actuary’s sphere of influence, integrate with and affect the actuary’s work.

The purpose of Section 5 is to complete your introduction to the Control Cycle by focusing on its Define the Problem, Design the Solution, and Monitor the Results stages. Section 5 also includes a Case Study
that enables you to apply your learning and review a sample actuarial problem in the context of the Control Cycle.

**Objectives:**
After you complete this section, you will be able to:
- Explain the purpose of the Control Cycle.
- Describe the elements of the Control Cycle.
- Explain how the Control Cycle facilitates actuarial work.
- Apply the Control Cycle in the context of an actuarial problem.

**Section 6: Communications**

**Description:**
In today's business environment, professionals of all disciplines are turning to actuaries to identify, quantify, and manage risk-related issues. You can no longer assume your role as an actuary is to tabulate numbers. The reasoning behind actuarial calculations and the business decisions resulting from actuarial analysis are valuable to today's organizations.

This section will provide you with tips and guidelines on how to communicate effectively with professionals across all disciplines. It will also provide video examples demonstrating effective communication, as well as videos of expert actuaries who share their tips for effective communication.

**Objectives:**
After you complete this section, you will be able to:
- Prepare to communicate by answering six key communication questions.
- Describe elements of effective presentations.
- Describe elements of effective reports.
- Eliminating and limiting use of acronyms.
- Avoid common mistakes when communicating as an actuary.
- Apply the principles of Actuarial Standards of Practice 41 (US), Standards of Practice 1700 (Canada), and Section 8 Principle 6 (UK)
Module 2: Core External Forces

Section 1: Module Overview

Description:
As you learned in Module 1, the actuary works within the framework of a Control Cycle—Define the Problem, Design the Solution and Monitor the Results—and manages this process to arrive at an optimal solution. Central to the actuary’s work is the continuous examination of the core external forces that create new problems, constrain any potential solutions, change the problem being solved or affect existing solutions.

External forces are any factors outside of the actuary’s sphere of influence. The purpose of Module 2 is to provide you with an understanding of how core external forces affect actuarial work.

Identifying these forces and determining their relevance and interrelationships will help you manage actuarial problems, projects and assignments. An understanding of external forces will help you assess risks in a variety of situations in an ever-changing environment.

Objectives:
After you complete this module, you will be able to:

- Define external forces.
- Describe and explain how the following categories of external forces apply within and across global areas of actuarial practice and fit into the Control Cycle framework.
  - Cultural/social values.
  - Demographics.
  - Governmental influences.
  - Economic/business environments.
  - Physical environment.
- Describe the changing nature of external forces.
- Explain how changes in external forces can lead to risk.

Section 2: External Forces and the Control Cycle

Description:
After describing the categories, Section 2 continues with readings that provide background information to help you better understand the actuarial context. Background information is provided on:

- the insurance industry
- health care delivery systems
- retirement income systems
- financial markets and considerations

External forces affect virtually everything we do as individuals and as actuaries. The purpose of this section is to provide you with an understanding of external forces affecting actuarial work and the role of these forces in the Control Cycle.

A method of categorizing external forces has already been introduced in Module 1 to make it easier to understand how various external forces affect actuarial problems and solutions. This section further
describes the categories (cultural/social values, demographics, governmental influences, economic and business environments, and physical environment) and presents examples of core external forces and their effects.

**Objectives:**
After you complete this section, you will be able to:
- Describe in simple terms how external forces fit into the control cycle.
- Define external forces.
- Describe categories and associated examples of external forces.
- Describe important external forces for actuaries working in the areas of life and health insurance, retirement benefits and specialty areas including investment, finance and enterprise risk management (ERM).

**Section 3: Cultural/Social Values**
**Description:**
In this section, you will learn about external forces within the cultural/social values category and how they influence the work of an actuary.

**Objectives:**
After you complete this section, you will be able to:
- Describe cultural/social values.
- Describe the application of cultural/social values across and within areas of actuarial practice.
- Explain the effects of cultural/social values on the Define the Problem and Design the Solution stages of the Control Cycle.

**Section 4: Demographics**
**Description:**
In Section 4 you will learn about external forces within the demographics category and how they influence the work of an actuary.

**Objectives:**
After you complete this section, you will be able to:
- Describe demographics.
- Describe the application of demographics across and within areas of actuarial practice.
- Explain the effects of demographics on the Define the Problem and Design the Solution stages of the Control Cycle.

**Section 5: Governmental Influences**
**Description:**
In Section 5, you will learn about external forces within the governmental influences category and how they affect the work of an actuary.
Fundamentals of Actuarial Practice (FAP)

Objectives:
- Describe governmental influences.
- Describe the application of governmental influences from a global perspective.
- Explain the effects of governmental influences on the Define the Problem and Design the Solution stages of the Control Cycle.

Section 6: Economic and Business Environments
Description:
In Section 6, you will learn about external forces within economic and business environments and how they can affect the work of actuaries.

Objectives:
After you complete this section, you will be able to:
- Describe economic and business environments.
- Describe economic and business applications across and within areas of actuarial practice.
- Explain the effects of economic and business environments on the Define the Problem and Design the Solution stages of the Control Cycle.

Section 7: Physical Environment
Description:
In Section 7, you will review aspects of the physical environment that can affect an actuary’s work.

Objectives:
After you complete this section, you will be able to:
- Describe aspects of the physical environment.
- Describe how the physical environment may affect actuarial work.

Section 8: External Forces and Change
Description:
In the previous sections of this Module you studied external forces and the roles they play in the Define the Problem and Design the Solution stages of the Control Cycle. In Section 8, we look at changes in external forces and the influence that these changes have on actuarial work.

As discussed in Module 1, the Control Cycle has a third stage, Monitor the Results. This stage is important because, even if you have properly defined the problem and designed and implemented an ideal solution, external forces can alter the problem and change the circumstances that led to the original solution. Monitoring results also provides an opportunity to create better solutions.

Objectives:
After you complete this section, you will be able to:
- Describe the changing nature of external forces.
- Explain how changes in external forces can lead to risk.
Module 3: Risk in Actuarial Problems

Section 1: Module Overview

Description:
During your Module 3 study, you will be exposed to typical actuarial problems and the processes used by actuaries to fully define problems. You will learn that problems revolve around risk and that identifying risks to be managed—i.e., looking below the surface—will help you to better define the real problem. You will learn how effective identification, analysis, and prioritization of various risks leads to a clearer definition of the problem and, ultimately, better solutions.

Objectives:
After you complete this section, you will be able to:

- Explain Define the Problem within the context of the Control Cycle.
- Explain the significance of identifying and defining the real problem and its associated risks.
- Describe risks that actuaries manage within a financial security system.
- Describe risk management for financial security systems from a global perspective.
- Identify commonalities among problems in existing areas of actuarial practice.

Section 2: Why Define the Problem

Description:
Section 2 focuses on Define the Problem as it fits in the Control Cycle and describes examples of scenarios where problems were not correctly defined.

Objectives:
After you complete this section, you will be able to:

- Explain how Define the Problem fits within the context of the Control Cycle.
- Given an example of a financial security system failure, describe how better problem definition could have been employed to help avoid the crisis.
- Recognize the significance of successfully defining problems.
- Identify risks related to financial security systems.

Section 3: Introduction to Risk

Description:
In Module 1 of the FAP course, you were introduced to the concept of risk. In this section, you will review risk and risk analysis as they relate to actuarial problems. You will also have a chance to explore how risk influences the Define the Problem stage of the Control Cycle.

This section also introduces foundations of risk analysis and management. For the purposes of this section, risk management is the art and science of balancing risk and reward across the functional areas within a financial security system.

Objectives:
After you complete this section, you will be able to:

- Define risk in an actuarial context.
• Describe risk management.
• Define risk types that need to be managed within a financial security system.
• Explain how risk is transferred from a consumer to a financial security system.
• Explain risk classification.

Section 4: Define the Problem and Identify Risks

Description:
In this section, you’ll look more closely at the relationship between identifying risks and the Define the Problem stage of the Control Cycle. You will be introduced to some of the basic tools often used by actuaries to analyze financial risks.

Objectives:
After you complete this section, you will be able to:
• Determine factors or influences that are important to identify and analyze risks.
• Use techniques commonly used in asset-liability management (ALM) with financial security systems.
• Describe the various risk measures that are used in ALM.
• Describe the capital requirements for a financial security system.
• Describe the role of risk measurement tools when analyzing the risks in financial and non-financial organizations.

Section 5: Recognize Problem Commonalities

Description:
Understanding the commonalities and similarities that many actuarial problems share provides a foundation or starting point as you define problems. This section examines some of those commonalities.

Objectives:
After you complete this section, you will be able to:
• Describe aspects of actuarial work that are both fundamental and common to all practice areas.
• Categorize commonalities in actuarial problems.
Module 4: Actuarial Solutions

Section 1: Module Overview

Description:
Module 4 demonstrates processes that are central to designing effective solutions to typical actuarial problems and exposes you to sample solutions that illustrate the work of an actuary.

Objectives:
After you complete this module, you will be able to:

- Explain how solution design fits into the context of the Control Cycle.
- Identify typical actuarial solutions.
- Describe important aspects of designing solutions.
- Describe the process of quantifying risks in ERM.
- Identify data needed to design a solution.
- Describe and use appropriate modeling techniques to design a solution.
- Describe the importance of assumptions when designing a solution with a global perspective.
- Describe the importance of validation and reconciliation techniques when designing a solution.

Section 2: Designing the Risk Management Solution

Description:
Actuarial solutions are complex and dynamic. Given a clearly defined problem and the associated risks that must be managed, and given a solid understanding of the needs of those who have a stake in the solution, actuaries are equipped to analyze a range of solutions and then produce an optimal solution.

Objectives:

- Identify categories and characteristics of actuarial solutions.
- Describe how approaches to managing risk are related to the types of risk.
- Recognize the significance of successful solution design.
- Describe elements of designing actuarial solutions.
- Design a solution for managing reinvestment risk in an insurance company when asset and liability cash flows do not match (asset-liability management).

Section 3: Data

Description:
The goal of the Design the Solution stage of the Control Cycle is to determine the optimal risk management solution for the identified problem and associated risks. What is data? How do actuaries use it? In what ways are actuaries responsible for the quality of data? What resource is needed when designing actuarial solutions?

Data is, after all, our measure of the real world.

Data is the backbone of all of the decision making and modeling that actuaries perform. Data is crucial to modeling both in terms of using data as inputs for the model and using data to make key decisions as to what assumptions are appropriate to use in modeling.
Data can also be used as the basis for predictive analytics, which risk managers may use in their decision making. Actuaries have a responsibility to ensure that the data used is appropriate and is as complete and accurate as possible. Decisions about how to identify, collect and use data directly affect the quality of the decision making and modeling results. The conclusions actuaries are able to make are dependent on data.

**Objectives:**
After you complete this section, you will be able to:
- Explain the role of data collection in solution design.
- Describe the considerations in managing data (e.g., sourcing, quality, quantity, relevancy, governance and use) with a global perspective.
- Describe data collection techniques.

**Section 4: Modeling**

**Description:**
If you were to conduct a search on the keyword “model” on the Society of Actuaries’ website, your search would result in over 1,000 matches across the range of publications. Predictive models, stochastic models, behavioral models, simulation models, asset models, contaminated exponential dispersion loss models...the list goes on and on.

**Objectives:**
After you complete this section, you will be able to:
- Define models and the modeling process.
- Describe the micro Model Control Cycle.
- Describe modeling considerations.
- Describe modeling techniques used when designing a solution.
- Select and use appropriate modeling techniques to design a solution.

**Section 5: Assumptions**

**Description:**
The quality of an actuarial solution depends on the quality of the underlying actuarial assumptions used.

Actuaries are specifically trained to develop assumptions to represent the key variables in the modeling process. The goal is to develop assumptions for the model that are appropriate for the original business problem and that generate adequate outcomes to support informed decision making.

Actuaries must review and quantify many different types of assumptions, with different characteristics, depending on the business problem and model. The consequences of inappropriate or inadequate assumptions may extend beyond the policyholder or client, to the financial system at large.
Objectives:
After you complete this section, you will be able to:
• Describe what an actuarial assumption is.
• Explain the importance of assumptions in actuarial work.
• Describe a methodology for creating assumptions.
• Identify the characteristics of actuarial assumptions.
• Identify some consequences of making inappropriate assumptions.

Section 6: Validation and Reconciliation

Description:
Developing and implementing a model involves a significant amount of resources. Actuaries face demanding deadlines around the modeling process, which may tempt them to accept the results from the model without performing a rigorous validation process. It is imperative that sufficient time be allotted to validating the model and subsequently reconciling the model results to emerging results. These activities help verify that the model used in the solution was appropriate for the original business problem.

Failure to properly validate and reconcile has been likened to a car manufacturer that devoted vast resources to developing an exquisite luxury car model. To meet the tight deadline of having the cars available for the new year, the manufacturer minimized the quality control efforts at the end of the manufacturing process. Imagine the manufacturer’s reaction when the first car came off the assembly line for a group of photographers and the front wheel fell off.

Objectives:
After you complete this section, you will be able to:
• Explain the roles of validation and reconciliation in the Control Cycle
• Distinguish between validation and reconciliation.
• Describe validation and reconciliation methods.
• Apply validation and reconciliation techniques.

Section 7: Landfill Case Study

Description:
You were introduced to the Landfill case study in Module 3. At that time, you were asked to assist in determining the letter of credit amount for New Site, a landfill site recently purchased by Mountain Landfill. This was an initial problem that had already been set out for you. At that time, you were also asked to consider an alternate method to solve the problem related to the pre-funding of New Site’s post-closure costs. Should Mountain Landfill establish a system to fund for the closure and post-closure costs associated with New Site in advance? If the post-closure costs were to be funded in advance, then how should advance funding be implemented and managed? The continuation of the Landfill case study in Module 4 addresses a risk management solution for this alternate funding method.

In Module 3, you were introduced to some of the underlying elements that will help you design this second solution to meet New Site’s post-closure costs problem. These include the external forces surrounding the post-closure administration of New Site Landfill, the regulatory environment governing the post-closure costs of New Site and the stakeholders who have an interest in this problem. The
elements that were introduced in Module 3 remain relevant to the new design of a solution in Module 4. In this section you will work on the post-closure costs problem of Mountain Landfill.

After you complete this section, you will be able to apply Module 4 concepts to design the solution to this problem.
Module 5: Design and Pricing of an Actuarial Solution

Section 1: Module Overview

Description:
You have already learned quite a bit about actuarial modeling. In Module 4, you were introduced to the Model Control Cycle, what a model is (“... a construction designed to imitate reality”) and why models are so important to actuarial work (“...actuaries gain insight into how the system operates and can assist their employers or clients in designing strategies to manage the financial risk in the system”). You were introduced to the modeling process, model selection and building, model limitations and modeling techniques. By the end of Module 4, you were able to understand how models are indispensable tools for designing solutions to actuarial problems.

In this module, Designing and Pricing an Actuarial Solution, you will further explore models by tying together what you have already learned into a framework for models that emphasizes pricing, reserving and funding.

Pricing is the function related to the determination of the cost for an individual to participate in a financial security system. Reserving is the function related to the determination of the amount of assets currently needed to be available to meet the financial security system’s obligations. Funding is the function related to the determination of the financial security system’s future capital needs and the allocation of current and future assets to meet those needs.

The purposes and details of each of these types of models will be analyzed.

Objectives:
After you complete this module, you will be able to:
- Explain how the fundamental actuarial formula provides the basis for all modeling.
- Demonstrate how models are applied to develop pricing, reserving and funding solutions.
- Explain how models are applied on an individual and group basis in the different practice areas.
- Apply primary and secondary models to practice area pricing, reserving and funding problems.

Section 2: Overview of Actuarial Models

Description:
This section introduces you to the concept of a fundamental actuarial formula that represents this idea as it pertains to risk management problems. This section also introduces you to a framework that categorizes actuarial models according to this formula. The framework provides a useful way of thinking about models and provides the structure for the remaining sections in this module.

Objectives:
After you complete this section, you will be able to:
- Describe how the fundamental actuarial formula provides the basis for all modeling.
- Describe how models are applied to develop pricing, reserving and funding solutions.
- Describe how models are applied on an individual and group basis in the different practice areas.
Section 3: Pricing Models

Description:
In this section, you will learn about pricing and pricing models, which are based upon the following fundamental formula:

\[ 0 = V_0 = \sum_{t=0}^{\infty} B_t d_t v_t - \pi_t \Delta_t v_t \]

In this section, you will also see how each practice area employs pricing models.

Objectives:
After you complete this section, you will be able to:
• Explain how pricing models are used to solve pricing problems.
• Explain how to use “secondary” models/methods to define parameters for pricing models.
• Apply primary and secondary models to practice area pricing problems.

Section 4: Models for Reserving and the Allocation of Capital

Description:
In the previous section, you learned about pricing problems and pricing models. In this section, you will learn about reserving problems and reserving models. Models for reserving purposes are created using the following simplified formula:

\[ V_x = \sum_{t=x}^{\infty} B_t d_{x,t} v^{t-x} - \pi_t \Delta_{x,t} v^{t-x} \]

Reserving is a process an actuary uses to determine the current liability associated with future claims. It is a point estimate for future periods.

Objectives:
In this section, you’ll learn more about reserving models. After completing this section, you will be able to:
• Explain how reserving models are used to solve for reserving problems.
• Explain how to use “secondary” models/methods to define parameters for reserving models.
• Apply primary and secondary models to practice area reserving problems.
• For reserving purposes, the application of models to solve the fundamental simplified equation as noted above can be completed on a “prescribed basis” or using a “principles-based” approach.
Section 5: Models for Funding and the Planning for Capital Needs

Description:
In the previous two sections, you learned about pricing and reserving and their associated models. In this section, you will cover funding models, which are created to solve the following simplified formula:

\[ V_x = \sum_{t=0}^{x-1} \pi_t \Delta_t x v^{t-x} - B_t d_{x,t} v^{t-x} \]

As mentioned in Section 2, funding involves the question “Will future funds be sufficient to meet the financial security system’s future needs?” Funding models are used by financial security systems to determine an appropriate build-up of funds to be used for future purposes. Traditionally, funding has been used to secure the long-term benefits promised to the beneficiaries of a financial security system. Funding methods were initially developed for defined benefit pension plans and you will begin your study of funding models with the models typically used for such plans.

Funding problems, however, also apply in the other practice areas. For example, an actuary working in the finance practice area must consider the problems associated with ensuring that the insurance company resources will be sufficient to meet its future obligations. This is a funding problem.

Objectives:
After you complete this section, you will be able to:

- Explain how funding models are used to solve funding problems.
- Explain how to use “secondary” models/methods to define parameters for funding models.
- Apply models to practice area funding problems.

Section 6: Tying It All Together

Objectives:
Are you able to answer the questions below?

- How does the fundamental actuarial formula provide the basis for all modeling?
- How are models applied to develop pricing, reserving and funding solutions?
- How are models applied on individual and group bases?
- How are models applied to the various areas of actuarial practice?
Module 6: Model Selection and Solution Design
Coming Soon

Module 7: Selection of Initial Assumptions
Coming Soon

Module 8: Monitoring Results
Coming Soon