COURSE STRATEGY GUIDE

CP 312 – Model Development and Governance
Nov 2025/Mar 2026/Jul 2026

This Course Strategy Guide provides an overview of CP 312, to help the candidate understand the essence of this course and to provide a Guide for how to prepare for the examination of this course. However, while this Guide can be a valuable aid in preparation, the material in this will not be tested.

I.   Purpose of this Course

The purpose of the Model Development and Governance course is to continue the model building education for our candidates at the FSA education level by covering more complex models and providing a solid foundation of model development and governance. Model development is an important skill to have for actuarial professionals. Thus, it is important for our candidates to gain a thorough understanding and knowledge of the development, application and usage of various models.

Model governance is an important framework that an organization uses to oversee model development, validation and usage to ensure regulatory compliance and proper control and accuracy. Thus, this course also covers model governance.

This course is a good supplement to all fellowship specialties, especially for candidates with an interest in long-term insurance products, as it enhances the analytical techniques and critical thinking skills of candidates to help them succeed in their careers.

This course has been developed assuming candidates are familiar with the content of the Advanced Long-Term Actuarial Mathematics (ALTAM) exam. CP 312 candidates who did not take ALTAM may want to review Chapter 15 (sections 1-3) of *Actuarial Mathematics for Life Contingent Risks*, Third Edition Dickson, C.M.D., Hardy, M.R., Waters, H.R. (2020) and Study Notes ALTAM-21-23: Variable Annuity Guarantees.

II.   Recommended Approach in Preparing for Course Exam

Our recommended study approach is to first read the descriptions of the Learning Objectives and Learning Outcomes in the syllabus; then read the Case Study in conjunction with the syllabus resource materials in the order presented for each course topic in the syllabus.

Keep in mind that each exam question is created by starting first with one or a combination of the Learning Objectives and Learning Outcomes. Each question will consider a context (possibly one from the Case Study, described below) that entails a modeling situation. The insights or

background from the syllabus resource materials are there to help the candidate develop and apply a solution that best fits within the context of the exam question.

Note that a solution to a given problem presented within the resource materials is appropriate for the context used within those resource materials, but not necessarily appropriate for the context of the exam question (often the context is that of the case study company and its modeling practices). Since the exam is focused on the demonstration of critical thinking, the candidate must learn how to take the learnings from one situation and apply them to a different situation. In creating such questions, the exam seeks to emulate real-world situations which, most of the time, do not have solutions that conveniently appear within any textbook.

Candidates are expected to apply the techniques or insights that they learn from the syllabus resource materials to new real-world problems. The candidate uses the study material as a tool to gain insights about the Learning Objectives and Learning Outcomes. These insights expressed in a solution to an exam question demonstrate critical thinking.

III.   The Case Study

A Case Study has been developed for this course. The purpose of having a Case Study as an integral part of the syllabus is to provide a context from which the candidates can internalize the study materials and apply some of the underlying concepts embedded in the study materials within the context of the Case Study company's products and models.

The Case Study focuses on the model development techniques and model governance of a fictional insurance company that offers several long-term products. Spreadsheet models for the company's products are provided as part of the Case Study. This allows candidates to gain insights on how to model various types of insurance and financial products and risks as well as to get hands on practice, albeit in a simplified environment.

The Case Study also provides a platform to have multi-dimensional product or business problems for candidates to demonstrate model development, application, validation and efficiency techniques.

The Case Study consists of a narrative pdf file and Excel spreadsheets with proxy models for some of the products offered by the company. These Excel spreadsheets are similar to the spreadsheets that accompany the *Long-Term Actuarial Models Part II* textbook, but they have been modified to remove functionality such as the use of macros that does not exist in the

SOA's exam environment. The pdf and the spreadsheets will be available to candidates when they sit for the exam.

IV.   Exam Syllabus Learning Objectives and Readings

Three topics are chosen for this course:

1. Cash Flow Models for Long-Term Insurance Business
2. Non-Cash Flow and Supplementary Models for Financial Business
3. Model Governance

Details of the Learning Objectives, Learning Outcomes and syllabus study materials associated with the Learning Outcomes for each of the three topics can be found in the Syllabus. The candidate should be familiar with the Learning Outcomes as described in the syllabus. These Learning Outcomes represent the knowledge candidates are expected to be able to perform after completing this course and will guide the assessment committee when developing questions.

These three topics are chosen for the following reasons:

Topic 1: Cash Flow Models for Long-Term Insurance Business

Most life, annuity and disability insurance products have long-term cash flows. Models are used for many purposes, such as pricing, valuation, planning and asset liability management. Thus, it is essential for candidates to master the cash flow modeling techniques for various types of long-term insurance business. Improper modeling could impact the financial health of an insurance organization. Thus, it is essential for the candidates to increase their insights and knowledge of the topics covered in Topic 1.

Over time, insurance products have become increasingly complex, which increases the risk exposures of the products and makes the modeling of these products more complicated as well. The complex product features also substantially increase the inherent risks of models. Thus, a video, "Model Risk Video and Notes," is introduced to this course to help the candidates understand the inherent risks embedded in modeling. This video aligns with Learning Outcome 1a. Chapter 3 of *Modeling in Life Insurance & Management Perspective* and Chapter 1 of *Long-Term Actuarial Models Part II* also help the candidates to gain insights on cash flow modeling development and applications. These chapters satisfy Learning Outcome 1a.

GI 301 – Further Topics in General Insurance
Nov 2025/Mar 2026/Jul 2026

Topic 1 focuses on models for insurance products with complex components:

- Dynamic policyholder assumptions
- Multi-states
- Equity-linked guarantees
- Index-linked credits

The syllabus materials covering these features expand the candidates' modeling knowledge to cover dynamic policyholder assumptions, multi-state model framework, and nested stochastic modeling. Thus, the following materials are chosen to enhance the necessary modeling knowledge and generally align with Learning Outcomes 1a to 1b:

- "AAA Considerations regarding Dynamic Lapses in Actuarial Modeling"
- Sections I.A, I.B-I.B.3a, I.B.4 of "Stochastic Modeling Theory and Reality from and Actuarial Perspective"
- Chapter 3, 6, 9 and 11 of *Long-Term Actuarial Models Part II,* and accompanying workbooks
- Sections 1.2-1.3, 3-6 of "Predictive Analytic & Machine Learning - practical applications for actuarial modeling"

Model validation and model efficiency techniques are essential to improve model accuracy and model performance. Thus, it is essential for our candidates to master the application of these techniques. Learning Outcomes 1c and 1d cover the model validation and efficiency techniques, respectively. Two articles are chosen to cover Learning Outcomes 1c and 1d:

- Section III of "Stochastic Modeling Theory and Reality from and Actuarial Perspective"
- Sections 1.2-1.3, 3-6 of "Predictive Analytic & Machine Learning - Practical Applications for Actuarial Modeling"

Two additional articles are chosen to cover Learning Outcome 1d only:

- "Heavy Models, Light Models and Proxy Models"
- Chapters 1-3 and 6 of *Metamodeling for Variable Annuities*

Topic 2: Non-Cash Flow and Supplementary Models for Financial Business
Topic 2 expands the candidates' knowledge of non-cash flow models. In today's world, there are many models used in the financial industry that are not cash flow based, such as economic scenario generators and market risk models. Thus, it is important for the candidates to be

familiar with some of the underlying concepts behind these models and be able to apply them, often in conjunction with long-term cash flow models.

The "Model Risk Video and Notes" video that helps the candidates understand the inherent risks embedded in modeling and covers Learning Outcome 1a, is also relevant for covering Learning Outcome 2a. Thus, this video is also included in this section.

An economic scenario generator (ESG) is a computer-based model that simulates possible future paths of economic and financial market variables. It is one of the most important models being widely used in scenario-based asset and liability modeling. Thus, the candidates need to understand the underlying methodologies of the ESG and its strengths, limitations and applications. The following materials, which include the American Academy of Actuaries Interest Rate Generator, are chosen to cover ESG under Learning Outcome 2a:

- Chapters 1, 2, 4.1-4.3, 5, 6, 7.1-7.3 and 8 **of** "ESGs: A Practical Guide"
- Part I of Issue 10 (November 2019) of "The Modeling Platform on ESGs"
- Part II of August 2020 of "The Modeling Platform on ESGs"
- Part III of July 2021 of "The Modeling Platform on ESGs"
- Academy Interest Rate Generator

Three types of commonly used non-cash flow models are also chosen to cover Learning Outcome 2a. They are market risk models, interest rate models and counterparty risk models. The following articles are chosen to cover these risk models respectively:

- Chapter 8 of the *Quantitative Enterprise Risk Management* textbook
- Chapter 7 of *Derivatives Theory and Practice*
- Chapter 9 of *Asset/Liability Management of Financial Institution*s

Catastrophic events can cause substantial losses to insurance companies and thus jeopardize the financial health of the companies. In recent years, climatic change has increased the importance of catastrophe modeling. Thus, this type of model is covered in Learning Outcome 2a. Two materials are selected to cover this type of modeling:

- Sections I.A, I.B-B.2, IB.3a, IIB-B.1.d of "Stochastic Modeling Theory and Reality from and Actuarial Perspective"
- "Catastrophe Modelling: Guidance for Non-Catastrophe Modelers"

Similar to Topic 1, model validation and model efficiency techniques are also essential to improve model accuracy and model performance for non-cash flow models. Thus, they are also

covered in Learning Outcomes 2b and 2c respectively. Stress testing and back-testing are commonly used techniques for model validation. Three sources are chosen for covering model validation techniques under Learning Outcome 2b:

- "A Financially Justifiable and Practically Implementable Approach to Coherent Stress Testing"
- Chapter 15 of *Measuring Market Risk*
- Chapter 7 of *Modeling in Life Insurance - A Management Perspective*
- Three articles are chosen for covering model efficiency techniques under Learning Outcome 2c:
- Sections IIB-B.1.d of "Stochastic Modeling Theory and Reality from an Actuarial Perspective"
- "Heavy Models, Light models and Proxy Models"
- Chapters 1-3 and 6 of *Metamodeling for Variable Annuities*

Topic 3: Model Governance
In Topic 3, the objective is to enhance candidates' knowledge of model governance best-practices and model governance process controls. Model governance is a framework that brings accountability and traceability to models and is intended to reduce the risk that model output is not reliably calculated or not used as intended. Without robust model governance in place, the model processes can be out of control, error-prone and non-compliant with government regulations. Negative consequences can be severe.

Model governance best practices are covered in Learning Outcome 3a. Learning Outcome 3b addresses the organizational structures for model governance, including controls, roles and responsibilities. Almost all materials in Topic 3 cover both Learning Outcomes 3a and 3b. The exceptions are three articles that cover only Learning Outcome 3a. They are:

- "ASOP 56: Modeling Dec 2019"
- "Model Validation for Insurance Enterprise Risk and Capital Models"
- "Machine Decisions: Governance of AI and Big Data Analytics"