COURSE STRATEGY GUIDE

CP 351 – Asset Liability Management

Nov 2026/Mar 2027/Jul 2027

This Course Strategy Guide is intended to provide candidates with an overview of course CP 351. We hope to suggest how to organize the readings into a logical sequence and be clear what candidates are supposed to learn from them, so the candidate can more efficiently fit the pieces together into mastery of a body of knowledge and demonstrate that mastery on the course assessment. However, while this Guide can be a valuable aid in preparation, the content of this Guide will not be tested.

I. Purpose of this Course

Financial institutions such as pension plans and life insurers exist to pay benefits to people at some future time. At the present time, an accounting provision for these future benefits is a liability, and determining the appropriate (and lawful) present value of this provision is the focus of much actuarial valuation work. On the left side of the balance sheet, assets provide for that liability and also for an accounting solvency measure called capital or sometimes surplus. Those assets must be invested so that enough will be available to pay the future benefits, while providing adequate liquidity and maintaining a capital buffer along the way. The practice of synchronizing a portfolio of investments to the projected liability cash flows within the constraints of liquidity and solvency is called asset liability management (ALM), which is the focus of this course. This multidisciplinary complexity is challenging and fascinating, and allows an ALM actuary to have a significant impact on the institution's total financial dynamics. The specifics of asset classes and constructing portfolios are covered in course INV 101.

The syllabus has been organized into three major areas of focus:

- Objectives of ALM
- Measuring Asset and Liability Risks
- Tools and Strategies to Manage ALM Risks

The readings build the candidate's knowledge, and each was selected to explain or illustrate one or more Learning Outcome Statements. The candidate should be very familiar with the Learning Outcome Statements as described in the syllabus. They were the first ingredient in developing the syllabus and also guide the Assessment Committee when writing questions. The Learning Outcome Statements set out the cognitive level needed to pass this course and also indicate what the candidates are expected to get out of the readings.

While studying the syllabus material candidates may want to consider the organizational approach provided by this Guide and refer back to the Learning Objectives and Learning

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Outcome Statements. This will help candidates remain focused on the educational goals of this course.

Within the major areas of focus, the following represents one way the candidate might approach the syllabus materials.

II. Recommended Approach in Preparing for the Course Assessment

Our recommended study approach is to first read the descriptions of the Learning Objectives and Learning Outcome Statements in the syllabus, then read the syllabus study materials in the order presented for each course topic section. The recommended order is purposeful. During this first reading make notes or flash cards of key points. Then proceed to a second, faster reading with stops to do practice problems or past assessment problems to ensure the concepts have been understood accurately.

Keep in mind that each assessment question is created by starting first with one or a combination of the Learning Objectives and Learning Outcome Statements. Each question will consider a context that entails a business situation or conflict. The insights or lessons learned from the syllabus study materials are there to help the candidate develop and apply a solution that best fits within the context of the assessment question.

Note that a solution to a given problem presented within the study materials is appropriate for the context used within those study materials, but not necessarily appropriate for the context of the assessment question - often the context is that of a sample company and its business strategies and management practices. Since the assessment 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 this assessment seeks to emulate real-world situations which, most of the time, do not have solutions that conveniently appear within any textbook.

III. Exam Syllabus Learning Objectives and Learning Outcomes

Candidates are expected to apply the techniques or insights that they learn from the syllabus study materials to new real-world problems, using the study material as a tool to gain insights about the Learning Objectives and Learning Outcome Statements. These insights, when expressed in a solution to an assessment question, demonstrate critical thinking and mastery of the topic.

Topic 1: Objectives of ALM

Syllabus section 1 introduces what ALM is and why it matters – an institutional investor must invest appropriately to back liabilities of (products sold by) the core organization (financial institution or pension plan). The value of the liabilities moves as capital markets move, and so does the value of the assets. This matters because capital equals the difference between asset and liability values, so to remain solvent the organization must manage the movements of these

values in real time and over time. Start with **CP351-100-26: IAA Risk Book - Asset Liability Management Techniques and Practices for Insurance Companies (2025)**, which introduces the topic and provides a corporate governance perspective on why ALM matters. The reading does refer to the low-rate environment which may have passed by now, but the principles still apply. Next read sections 1 and 2 of **CP351-101-25: ALM for Life, Annuities, and Pensions.** These align with Learning Outcome Statement *1a*.

Without adequate resources, management support, and careful design and execution, ALM can go terribly wrong. To further appreciate why ALM matters we will look at a few ALM failures in insurance in **CP351-102-25: Case Study on General American,** and sections 1, 2, 4 and 6 in chapter 20 of ***Financial Enterprise Risk Management*, Sweeting, P., 2nd Edition, 2017**. More examples of ALM failures are discussed in sections 3.2, 3.3, 3.4 and 3.10 in **CP351-115-26: IAA Risk Book ERM Insights from Failures and Near Failures**. On the banking side the March 2023 collapse of Silicon Valley Bank offered many lessons. Following this, the SOA Research Institute convened an expert panel, whose conclusions are summarized in **What Can Insurers and Pension Funds Learn from Bank Failures**. That reading is high level but helps spell out these lessons. These readings align with Learning Outcome Statement *1b*.

We next look at sources of risks in product liabilities, their supporting assets, and the interaction of the two. Chapter 8 of ***Financial Enterprise Risk Management*, Sweeting, P., 2nd Edition, 2017** provides an overall risk framework for a financial organization. Next, chapter 2 of ***Quantitative Enterprise Risk Management*, Hardy, Mary and Saunders, David, 2022** gets detailed about risks, including financial markets, the macroeconomic environment, regulation, internal operational risks, legal and reputational risks, and product risks. Finally, the first of two Milliman papers, **CP351-104-25: Life Insurance Risk, Capital, and ALM in the Age of Uncertainty - Paper 1 – Risk Inventory, Taxonomy, Calibration** looks at whether life insurers have changed how they identify and prioritize risks. These readings support Learning Outcome Statement *1c*. We realize that's a lot on identifying risks, but ALM is highly multidimensional and its practice has implications for most areas of the organization.

Insurance policies have options embedded in them – surrender for cash value, take a loan, and others – and these can be expected to be exercised against the company at inopportune times. The ALM specialist manages the risks from these options with techniques described in section 3 of **CP351-101-25: ALM for Life, Annuities, and Pensions**, which introduces the liability-side context for investing for life insurers. **CP351-105-25: Chapter 16 of Asset/Liability Management of Financial Institutions, Tilman 2003** digs deeper. Chapters 1-2 of **CP351-106-25: Liability Driven Investment Explained** addresses options embedded in pension funds. These cover Learning Outcome Statement *1d*.

Topic 2: Measuring Risks from Assets and Liabilities

If an organization is to manage a set of risks, then it must quantify exposures to them and the effects of steps taken to mitigate them. Section 4 of **CP351-101-25: ALM for Life, Annuities, and Pensions** covers duration and convexity. These can be decomposed into different points on the yield curve, described in **CP351-107-25: Key Rate Durations: Measures of Interest Rate Risk**. We

start to add hedges in chapters 4 and 5 of ***Fixed Income Securities: Tools for Today's Markets*, Tuckman, Bruce and Serrat, Angel, 4th Edition, 2022**.

One more tool an ALM actuary must master is the proper use of risk-neutral valuation. Some have been heard to say, "we'll just discount at Treasury yields so that's risk free so everything is consistent". This is not correct! The correct discount rates and use of risk-neutral measure is laid out beautifully in sections 1-5 of **Understanding the Connection Between RW and RN Generators,** including the **Companion Excel-based Tool**. These readings all address Learning Outcome Statement *2a*.

The ALM actuary will need to evaluate a financial entity's exposure to various risks, which often involves extensive actuarial modeling work. **CP351-108-25: Life Insurance Risk, Capital, and ALM in the Age of Uncertainty - Paper 2 – Risk Models and Monitoring, and Management Implications** provides an overview of considerations.

This is all fine, but an organization needs liquidity (sufficient cash) to survive today, accounting capital to survive the next quarter-end financial reporting checkpoint, and then ALM comes into play. Thus, we look at the AAA paper on **Liquidity Risk**. Back into modeling, chapter 8 of ***Quantitative Enterprise Risk Management*, Hardy, Mary and Saunders, David, 2022,** and chapter 6 of ***Fixed Income Securities: Tools for Today's Markets*, Tuckman, Bruce and Serrat, Angel, 4th Edition, 2022** explore an organization's risk exposures, supporting Learning Outcome Statement *2b*.

ALM actuary needs to understand different approaches to regulatory capital adequacy in order to properly model ALM risks. **Regulatory Capital Adequacy for Life Insurance Companies, A Comparison of Four Jurisdictions** compares and contrasts four key regulatory capital regimes. The main purpose of this reading is to give the candidates good understanding of how required capital may vary depending on the jurisdiction. This reading covers Learning Outcome Statement *2c*.

Pension plans and some insurance products may have long-tail benefit cash flows, in some cases beyond 30 years. Investing to support such benefits is difficult because fixed income securities rarely have maturities beyond 30 years, and equity investments generally have significant volatility. In addition, the precision of modeling long-tail cash flows is very limited. These challenges are introduced in **CP351-110-25: New Frontiers: Backing Long-term Insurance Liabilities with Non-fixed-income Assets**. Note that this paper briefly refers to CALM, the Canadian Asset Liability Method for setting life insurer reserve amounts. Canada's adoption of the international standard IFRS 17[1] has made CALM obsolete, but the concepts apply. The reading does not get into the details of CALM and candidates will certainly not be tested on its details!

[1] https://www.ifrs.org/content/dam/ifrs/project/insurance-contracts/ifrs-standard/ifrs-17-factsheet.pdf

Lastly, strategies for dealing with long-tail liability cash flows are suggested in section 6 of **CP351-101-25: ALM for Life, Annuities, and Pensions.** These two readings address Learning Outcome Statement *2d*.

Topic 3: Tools and Strategies to Manage ALM Risks

Now it is time to put it all together and build asset portfolios appropriate to institutional liabilities. By this we mean not just a liability amount on the right side of a balance sheet, but a stream of cash flows the organization is projected to have to pay out into the future. Section 5 of **CP351-101-25: ALM for Life, Annuities, and Pensions** introduces the topic, and chapters 3-7 of **CP351-106-25: Liability Driven Investment Explained** continue with a pension plan focus. Note at the top of the title page it says "For professional investors only" – that is what you are becoming. A glossary begins on page 39 which may help with the terminology. These readings support Learning Outcome Statement *3a*.

The long-term modeled ideal portfolio, given a liability profile and assumptions such as return, risk, correlation, is called the institution's strategic asset allocation (SAA), introduced in chapter 13 of ***Handbook of Asset and Liability Management, Volume 2,*** **Zenios, Stavros, and Ziemba, William, 2007**. Another useful tool that helps with understanding the interaction of the distributions of two random variables is examined in chapter 6 of ***Quantitative Enterprise Risk Management,*** **Hardy, Mary and Saunders, David, 2022** and **CP351-112-25: The Devil is in the Tails: Actuarial Mathematics and the Subprime Mortgage Crisis**. We take the title of the second paper as a challenge to our profession to advance to more modern mathematical techniques. Copulas are particularly useful for examining the tails of distributions such as in setting economic capital.

Liability cash flows must be projected using models sophisticated enough to capture their interaction with the asset portfolios in different market environments. Model building is best learned by doing, but we provide an introduction to the issues in **CP351-113-25: Chapter 4 of *Asset and Liability Management for Banks and Insurance Companies,* Habart.** Chapter 18 of ***Handbook of Asset and Liability Management, Volume 2,*** **Zenios, Stavros, and Ziemba, William, 2007** introduces investing for pension funds. These readings support Learning Outcome Statement *3b*.

An important way in which actuaries use these models is to study stress economic or business scenarios, providing insight into risk exposures. Stress testing and scenario analysis is addressed in **CP351-113-25: Chapter 4 of *Asset and Liability Management for Banks and Insurance Companies,* Harbart**, in chapter 7 of ***Quantitative Enterprise Risk Management,*** **Hardy, Mary and Saunders, David, 2022,** and in chapter 18 of ***Handbook of Asset and Liability Management, Volume 2,*** **Zenios, Stavros, and Ziemba, William, 2007**. These readings support Learning Outcome Statement *3c*.

As model results are increasingly used to determine financial statement values whose changes can be the dominant force behind reported earnings, assumption setting and model validation have evolved into important control functions. While **CP351-113-25: Chapter 4 of *Asset and Liability Management for Banks and Insurance Companies,* Harbart** discusses challenges in

building cash flow projection models and cover a wide range of topics such as asset class granularity, cost modelling, and policyholder behavior, chapter 14 of ***Quantitative Enterprise Risk Management*, Hardy, Mary and Saunders, David, 2022** explores model governance, parameter risk, and data quality issues. These readings align with Learning Outcome Statement *3d*.

With these insights into the portfolio the ALM practitioner can design strategies to reduce or offset these risks, either within the portfolio or with a hedge. Section 5 of **CP351-101-25: ALM for Life, Annuities, and Pensions**, chapter 15 of ***Quantitative Enterprise Risk Management*, Hardy, Mary and Saunders, David, 2022,** and chapters 5 and 6 of ***Fixed Income Securities*, Veronesi, P., 2010** explore these techniques, aligning with Learning Outcome Statements *3e* and *3f*.

Finally, an important consideration for the ALM practitioner is to take into account potential ways available for transferring risk, such as reinsurance and pension buyouts. These approaches are discussed in chapter 16 of ***Quantitative Enterprise Risk Management*, Hardy, Mary and Saunders, David, 2022**, addressing Learning Outcome Statement *3g*.

IV. Guidance for Assessment

The candidate should take note to focus on both the specific concepts and overarching principles addressed in the course syllabus. Candidates may be asked to apply concepts and principles in a particular context in an assessment question. For example, although the candidate is not expected to remember detailed nation-specific accounting requirements, the candidate may be expected to understand how to apply accounting requirements for products or portfolios within a specific regulatory environment as specified in the assessment.

Once you have completed your Fellowship, additional resources that may be useful but are not covered in this course include:

- Liquidity Risk Practice Note, American Academy of Actuaries (February 2024)

For general insurance (property and casualty insurance) investing, see:

- ALM Strategies for General Insurers, Society of Actuaries (2022)
- Any of Warren Buffett's annual letters describing what he calls "float"

For advanced interest rate modeling, see:

- Interest Rate Models – Theory and Practice, Damiano Brigo and Fabio Mercurio
- Calibrating Interest Rate Models, Society of Actuaries (2023)

The Curriculum Committee hopes this guide helps you connect the themes in the readings into a more integrated, comprehensive understanding of the whole syllabus.

We remind the candidate once more that mastering the Learning Outcome Statements is of paramount importance to success on the end of course assessment. The Statements set the cognitive level (list, demonstrate, apply, develop, critique, recommend (with a justification!), etc.) needed to pass. Do review the Learning Outcome Statements to ensure that you understand how

the course of reading fits with them. The assessment questions are designed to test the syllabus material, but more importantly they have been written to test the Learning Outcome Statements.

V. Syllabus Updates

- October 2016 **IAA Risk Book - Asset Liability Management** was replaced with the updated July 2025 edition.
- Two less relevant case studies (sections 8 & 10) from chapter 20 of ***Financial Enterprise Risk Management*, Sweeting, P., 2nd Edition, 2017**, as well as the note **Risk Management Lessons Learned from SVB** were removed. In their place four cases (sections 3.2, 3.3, 3.4 & 3.10) from **IAA Risk Book ERM Insights from Failures and Near Failures** were added.
- **IAIS Application Paper on Liquidity Risk Management** was replaced by a more up-to-date **AAA Liquidity Risk** paper.
- SOA Research paper **Regulatory Capital Adequacy for Life Insurance Companies** was added.
- **Chapter 3 of *Modelling in Life Insurance: A Management Perspective*** was removed.
- Chapter 16 (Risk Transfer) of ***Quantitative Enterprise Risk Management*, Hardy, Mary and Saunders, David, 2022**, was added.