

# EDUCATION COMMITTEE OF THE SOCIETY OF ACTUARIES (SOA)

## INTRODUCTORY STUDY NOTE

**EXAM SESSION:** SPRING 2019

**EXAM:** ENTERPRISE RISK MANAGEMENT

**DATE & TIME:** Friday, May 3, 2019; 8:30 a.m. – 12:45 p.m.

1. The examination will consist of four hours of written answer questions. A read-through time of 15 minutes will be given prior to the start of the exam. No writing is allowed during the read-through time.
2. The following link shows a recommended FSA module/exam sequence for each track:  
<http://www.soa.org/Education/Exam-Req/edu-new-fsa-recommended.aspx>  

This order is NOT mandated. Each candidate will determine the appropriate sequence based on factors including readiness to sit for an exam, exam administration schedules, or study time available. However, the Education committees believe that these recommendations provide the most effective guide for candidate success. An examination/module may assume familiarity with material that is covered in any requirement that is recommended to come before that examination or module.
3. The Syllabus material includes textbooks, online readings, and the study notes listed in the Appendix. Study notes listed with an asterisk (\*) will also be included in the Revision set of study notes. The Appendix also may contain additional important information regarding this exam. A complete listing of the Syllabus and Learning Objectives is located in this exam's home page on the SOA Web site.
4. Several book distributors carry some or all of the textbooks for the Society of Actuaries exams. A list appears on the SOA Web site: <http://www.soa.org/education/exam-req/resources/edu-txt-manuals.aspx>.
5. Any changes in the Syllabus for this exam will be published under "Updates" in this exam's home page on the SOA Web site.
6. Past exams, solutions and case studies are available at: <http://www.soa.org/education/exam-req/syllabus-study-materials/edu-multiple-choice-exam.aspx>
7. When registering for this examination, candidates must select from six reading extensions. The Case Study for this examination also includes some extension-specific portions. Twenty-five percent of the examination points will be based on the Case Study and the selected extension. These questions may also draw on material from the core reading. Be sure to answer the questions asked by referring to the case study. For example, if asked for advantages of a particular plan design to a company referenced in the case study, limit your response to the specifics for that company. Other advantages should not be listed as they are extraneous to the question and will result in no additional credit. Further, if they conflict with the applicable advantages, no credit will be given. Candidates are advised to familiarize themselves with the

case study. A copy will be included in the examination booklet. Candidates will not be allowed to bring their study note copy of the case study into the examination room.

8. The candidate should be very familiar with the Learning Objectives. These Learning Objectives are the first ingredient in developing the syllabus and also guide the examination committee when writing questions. The Learning Objectives set out the cognitive level needed to pass this exam. You will notice that the candidates are expected to “analyze,” “explain,” “calculate,” “describe,” “apply,” etc. While studying the syllabus material, candidates may want to refer back to the Learning Objectives to remain focused on the goals of the exam.
9. The examination questions for this exam will be based on the required readings for this exam. If a conflict exists (in definitions, terminology, etc.) between the readings for this exam and the readings for other exams, the questions should be answered on the basis of the readings for this exam.
10. Candidates may ONLY use these battery or solar-powered Texas Instruments models: BA-35, BA II Plus\*, BAII Plus Professional\*, TI-30Xa, TI-30X II\* (IIS solar or IIB battery), and TI-30X MultiView\* (XS solar or XB battery). Candidates may use more than one of the approved calculators during the examination.

Calculator instructions may not be brought into the exam room. During the exam, the calculator must be removed from its carrying case so the supervisor can confirm that it is an approved model. Candidates using a calculator other than the approved models will have their exams disqualified.

Candidates can purchase calculators directly from: Texas Instruments, Attn: Order Entry, PO Box 650311, Mail Station 3962, Dallas, TX 75265, phone 800/842-2737 or <http://epsstore.ti.com>.

*\*The memory of the **BA II Plus, BA II Plus Professional, TI-30X II and TI-30X MultiView** calculators will need to be cleared by the examination supervisor upon the candidate’s entrance to the examination room.*

11. A list of various seminars/workshops and study manuals appears on the SOA Web site <http://www.soa.org/education/exam-req/resources/edu-sem-workshops.aspx> and <http://www.soa.org/education/exam-req/resources/edu-txt-manuals.aspx>. These seminars/workshops and study manuals do not reflect any official interpretation, opinion, or endorsement of the Society of Actuaries or its Education Committee.

Please note that the Education Committee expects candidates to read the material cited in the *Syllabus* and to use other material as a complement to the primary sources rather than a substitution for them.

12. The Society of Actuaries provides study notes to persons preparing for this examination. They are intended to acquaint candidates with some of the theoretical and practical considerations involved in the various subjects. While varying opinions are presented where appropriate, limits on the length of the material and other considerations sometimes prevent the inclusion of all possible opinions. These study notes do not, however, represent any official opinion,

interpretation or endorsement of the Society of Actuaries. The Society is grateful to the authors for their contributions in preparing study notes.

The American Academy of Actuaries, the Canadian Institute of Actuaries, the Conference of Consulting Actuaries, and the Society of Actuaries jointly sponsor various examinations administered by the Society of Actuaries.

## APPENDIX

Study notes for this exam

Code	Title
	Case Study <b>(Available on syllabus page of Web site)</b>
ERM-52-17	Courseware – A Guide to the ERM Exam Core Readings
ERM-101-12	Measurement and Modelling of Dependencies in Economic Capital
ERM-102-12	Value-at-Risk: Evolution, Deficiencies and Alternatives
ERM-103-12	Developments in Modelling Risk Aggregation, pp. 72-89
ERM-104-12	Study Note on Parameter Risk
ERM-105-12	Coherent Measures of Risk: An Exposition for the Lay Actuary
ERM-106-12	Economic Capital Modeling: Practical Considerations
ERM-107-12	Chapter 7 of <i>Strategic Risk Management Practice: How to Deal Effectively with Major Corporate Exposures</i>
ERM-110-12	Derivatives: Practices and Principles
ERM-111-12	Key Rate Durations: Measures of Interest Rate Risks
ERM-112-12	Revisiting the Role of Insurance Company ALM within a Risk Management Framework
ERM-115-13	The Next Chapter: Creating an Understanding of Special Purpose Vehicles
ERM-117-14	AAA Practice Note: Insurance Enterprise Risk Management Practices
ERM-118-14	Model Validation Principles Applied to Risk and Capital Models in the Insurance Industry
ERM-119-14	Aggregation of Risks and Allocation of Capital
ERM-120-14	IAA Note on Stress Testing and Scenario Analysis
ERM-122-16	Chapter 1 of <i>Captives and the Management of Risk</i> , Third Edition
ERM-123-14	S&P Enterprise Risk Management Criteria

<b>Code</b>	<b>Title</b>
ERM-124-15	Chapter 2 of <i>Counterparty Credit Risk: the New Challenge for Global Financial Markets</i>
ERM-125-15	Chapter 10 of <i>Loss Models: Further Topics</i>
ERM-126-15	ORSA—An International Requirement
ERM-127-17	Chapter 2 of <i>Quantitative Enterprise Risk Management</i>
ERM-128-17	The Breadth and Scope of the Global Reinsurance Market Plays in Supporting Insurance in the United States
ERM-129-18	Model Governance Checklist—Some Considerations for Practicing Life Actuaries
ERM-130-18	Model Governance Practice Note—Some Considerations for Practicing Life Actuaries
ERM-131-18	Leveraging COSO Across the Three Lines of Defense
ERM-132-18	Best Practices for Creating Your Own ORSA Report
ERM-309-13	Risk Assessment Framework for Federally Regulated Private Pension Plans
ERM-321-14	LDI Evolution: Implementing Dynamic Asset Allocation Strategies that Respond to changes in Funded Status
ERM-327-17	Pension Funding Strategy: Considerations for Prefunding a Pension Plan
ERM-328-17	Retirement for the Ages: Building Enduring Retirement Income Systems
ERM-329-17	Risk Factors as Building Blocks for Portfolio Diversification: The Chemistry of Asset Allocation
ERM-330-17	Liability-Relative Investing
ERM-331-17	Quantifying the Mortality-Longevity Offset
ERM-401-12	Mapping of Life Insurance Risks
ERM-405-14	Secondary Guarantee Universal Life: Practical Considerations
ERM-408-14	The Captive Triangle: Where Life Insurers' Reserve and Capital Requirements Disappear
ERM-409-14	A Brief Primer on Financial Reinsurance
ERM-410-14	Coinsurance and its Variants
ERM-412-17	Surrenders in the Life Insurance Industry and Their Impact on Liquidity
ERM-413-17	Hedging for Liabilities in Life Insurance Companies
ERM-414-17	A Tale of Two Formulas: Solvency II SCR vs RBC
ERM-415-17	Strategic Risk Management in Insurance: Navigating the Rough Waters Ahead

<b>Code</b>	<b>Title</b>
ERM-416-19*	Responding to the Variable Annuity Crisis
ERM-417-19*	A Natural Hedge for Equity Indexed Annuities
ERM-418-19*	Low Interest Rates and the Implications on Life Insurers
ERM-419-19*	How Life Insurers Combat Anti-Selection
ERM-501-12	Risk Based Capital—General Overview
ERM-512-13	Sections 5.4 and 5.5 of <i>Health Economics and Financing</i>
ERM-513-13	Extending the Insurance ERM Criteria to the Health Insurance Sector
ERM-517-15	The Cost of Waiting
ERM-518-19*	NAIC Own Risk and Solvency Assessment (ORSA) Guidance Manual
ERM-520-17	Differing Impacts of Market Concentration on Affordable Care Act Marketplace Premiums
ERM-521-17	Risk Transfer Formula for Individual and Small Group Markets Under the Affordable Care Act
ERM-522-17	Risk Selection Threatens Quality of Care for Certain Patients: Lessons from Europe's Health Insurance Exchanges
ERM-523-18	Why Are Many CO-Ops Failing?
ERM-524-18	Chapter 18 of <i>Life &amp; Health and Annuity Reinsurance</i> , Fourth Edition
ERM-525-19*	Top Health Industry Issues of 2018: A Year for Resilience Amid Uncertainty
ERM-526-19*	The Risks of Pricing New Insurance Products: The Case of Long-Term Care
ERM-602-12	<i>Investment Management for Insurers</i> , Babbel and Fabozzi, Chapter 11, The Four Faces of an Interest Model
ERM-612-17	Chapter 7 of <i>Modern Investment Management: An Equilibrium Approach</i>
ERM-613-17	Chapter 6 Sections 4 & 5 of <i>Managing Investment Portfolios: A dynamic Process</i> , Third Edition
ERM-614-19*	An Asset-Liability Version of the Capital Asset Pricing Model with a Multi-Period Two-Fund Theorem
ERM-615-19*	The Devil is in the Tails: Actuarial Mathematics and the Subprime Mortgage Crisis
ERM-616-19*	Replicating Portfolios—An Introduction: Analysis and Illustrations
ERM-617-19*	Chapters 17, 19 and 29 of <i>Options, Futures, and Other Derivatives</i> , 10 <sup>th</sup> Edition
ERM-702-12	IAA Note on ERM for Capital and Solvency Purposes in the Insurance Industry, Pages 9–38
ERM-705-12	P&C RAROC: A Catalyst for the Improved Capital Management in the Property and Casualty Insurance Industry

Code	Title
ERM-708-13	Natural Catastrophe Loss Modeling
ERM-710-14	Allocation of Capital in the Insurance Industry
ERM-711-16	Risk Appetite Working Party (GIRO) Risk Appetite for a General Insurance Undertaking
ERM-712-16	Catastrophe Modelling: Guidance for Non-Catastrophe Modellers
ERM-713-16	Stochastic Modelling of Catastrophe Risks in DFA Models
ERM-714-18	U.S. Property-Casualty: Underwriting Cycle Modeling and Risk Benchmarks (section 2, pp. 95-108)
ERM-715-19*	The US Casualty Market in 2018: Our Top 10 List
ERM-716-19*	Property/Casualty Insurance Company Insolvencies
ERM-717-19*	2018 Insurance Outlook—Shifting Strategies to Compete in a Cutting-Edge Future
ERM-718-19*	Why Insurers Fail: The Dynamics of Property and Casualty Insurance Insolvency in Canada
ERM-719-19*	Top 10 Trends in Property & Casualty Insurance 2018—What you Need to Know
ERM-720-19*	Insurance, Climate Change and Sustainable Development
ERM-811-15	Agency Theory and Asymmetric Information
ERM-812-15	Chapter 1 of <i>Valuation for Mergers and Acquisitions</i> , Second Edition
ERM-813-15	Financial Structure, Capital Structure (Capitalization), and Leverage Explained
ERM-814-15	Cognitive Bias and their Implications on the Financial Market
ERM-817-17	Speech by SEC Staff: The Role of Compliance and Ethics in Risk Management
ERM-819-19*	Exchange Rate Risk Measurement and Management Issues and Approaches for Firms
ERM-820-19*	CRO Forum Concept Paper on a Proposed Categorisation Methodology for Cyber Risk

The following additional information applies to this exam:

1. ERRATA:

- ERM-119-14, pp. 22-23: Please note that simulation from copulas as described on page 23 is incorrect

## 2. EXAM OVERVIEW

The syllabus for this exam trains candidates in the financial and risk management aspects of operating and evaluating a financial institution or other entity, with particular emphasis on enterprise risk management (ERM) concepts. This includes gaining an understanding of several subjects, including risk identification, risk measurement and management, risk modelling and risk measures.

This overview section is intended to provide candidates with an approach for organizing the course of reading for studying the various sections of the syllabus. In addition, the candidates should be familiar with the Learning Objectives as described in the syllabus. These Learning Objectives were the first ingredient in developing the syllabus, and provide an indication of the level of understanding required for each major area of focus. While studying the syllabus material, candidates may want to consider both the organizational approach provided by this overview note, and to refer back to the Learning Objectives to remain focused on the goals of the Enterprise Risk Management exam. The courseware study note provides additional guidance with regard to relating the core readings to the learning objectives.

The syllabus has been organized into five major areas of focus, which align with the Learning Objectives: Risk Categories and Identification; Risk Modelling and Aggregation of Risks, Risk Measures, Risk Management Tools and Techniques and Economic Capital. Note that many syllabus sources relate to more than one topic. In the exam, candidates will be expected to integrate material across the various topics.

The candidate should focus on both the concepts and principles addressed in the exam syllabus. Candidates may be asked to apply concepts and principles in a particular context in an examination question. For example, although the candidate is not expected to remember detailed economic capital requirements the candidate is expected to understand how the concept of economic capital may apply to different business entities as specified in the examination.

The exam comprises three types of questions: Focus (covers single Learning Objective), Integrated (synthesizes multiple Learning Objectives) and Case Study.