

2012 Syllabus of Basic Education

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Exam Registration..... <http://www.casact.org/admissions/syllabus/index.cfm?fa=forms>

CAS Online Store..... <https://netforum.casact.org/eweb/DynamicPage.aspx?webcode=COEPubSearch>

Note: This *Syllabus* is subject to change in the future. The CAS is not responsible for any errors or omissions in the *Syllabus*.

2012 Syllabus Updates

Updated: 11 September 2012

The “Syllabus Updates” section contains only changes or updates made to the 2012 *Syllabus of Basic Education* after it was posted online. Changes to the readings for individual exams from the previous year are reflected in that specific exam’s syllabus section.

[CAS Online Course 2](#)

Insurance Accounting, Coverage Analysis, Insurance Law, and Insurance Regulation

The original CAS Online Course 2 (CA2 Version 1) is being revised effective September 1, 2012. CA2 Version 1 will no longer be sold to candidates after August 31, 2012. However, the exam for CA2 Version 1 will be offered through June 15, 2013. CA2 Version 2 will be available September 1, 2012, and exams on this content will be offered for the first time on January 15, 2013. While there will be no new sales of CA2 Version 1 after August 31, 2012, the online course will be available and unchanged through June 15, 2013. Candidates who purchase CA2 Version 1 course materials and who do not pass the exam by June 15, 2013 will need to purchase the online course CA2 Version 2.

[Joint Exams 1, 2, 3F, and 4](#)

For exams that are jointly sponsored by the CAS, SOA, and CIA, the updates are included on the Web page for the specific exam: Exam [1/P](#), [2/FM](#), [3F/MFE](#), and [4/C](#).

[Waivers](#)

The CAS recognizes the exam waivers granted by the Canadian Institute of Actuaries University Accreditation Program for Exams 2/FM, 3F/MFE, 3L, and 4/C. The CAS will only grant waivers for CIA UAP exam credits that were awarded based on work at universities in Canada.

[Exam 3L](#)

Cunningham, R.; Herzog, T.; and London, R., *Models for Quantifying Risk* (Fourth Edition), 2011, ACTEX Publications, Chapters 5.1-5.4, 6.1-6.4, 6.6, 7.1-7.4, 8.1-8.3, 9.1-9.2, 9.4, 10.1, 10.3, 12.1-12.2, 12.4.1-12.4.4, 12.6, and 13.1-13.3. Candidates are not responsible for formulae 6.51 through 6.55 nor are they responsible for the “Hyperbolic (Balducci)” column of Table 6.3.

Learning Objectives A.1 and A.4 have been updated to reflect sections that have been removed (26 March 2012).

[Exam 5](#)

Friedland, J.F., *Estimating Unpaid Claims Using Basic Techniques*, Casualty Actuarial Society, Third Version, July 2010. **Appendices A and B are integral parts of this reading.**

Knowledge Statement B.3.a was changed to "Standards of Practice, ASOP 43" i.e., ASOP 9 was removed.

Werner and Modlin, *Basic Ratemaking*, Fourth Edition: The equation at the top of page 77 did not properly convert to PDF but was corrected and posted on 29 December 2011. Page 165, there was an error in the subscript in the section starting "Indicated Differential Change =" where the upper P was corrected to $P_{C,i}$ on 4 January 2012.

[Exam 6-Canada](#)

Canadian Council of Insurance Regulators, Annual Statement Instructions P&C-1, 2011, Sections I, III, IV, V, and VI, excluding instructions for Annual Return pp. 10.10-10.30, 20.60, 40.10-50.50, 67.15, 67.31, 70.40, 90.15 and 90.70. **NOTE: Please use the 2011 edition that has been archived on the CAS Web Site with permission for educational purposes.**

Canadian Institute of Actuaries, "Educational Note: Evaluation of the Runoff of Claim Liabilities when the Liabilities are Discounted in Accordance with Accepted Actuarial Practice," May 2011—Note: When originally posted, the link went to an older version but was corrected. Please be sure to use the 2011 version.

Freihaut, D.; and Vendetti, P., "Common Pitfalls and Practical Considerations in Risk Transfer Analysis," Casualty Actuarial Society E-Forum, Spring 2009. Appendices A and B are for information only and will not be directly tested.

McCarty, K.M., "Testimony of Kevin M. McCarty, Florida Insurance Commissioner, Florida Office of Insurance Regulation and Representing the National Association of Insurance Commissioners, Regarding: 'The Impact of Credit-Based Insurance Scoring on the Availability and Affordability of Insurance,' May 21, 2008," Subcommittee on Oversight and Investigations of the House Committee on Financial Services, excluding Appendices 1 and 2.

Office of the Superintendent of Financial Institutions Canada, "Canadian Vision for Property and Casualty Insurer Solvency Assessment," the final version is dated December 2011.

Office of the Superintendent of Financial Institutions Canada Guideline E-18, "[Stress Testing](#)," December 2009.

Office of the Superintendent of Financial Institutions Canada Uniform Annual Return, 2011, Approved by the Canadian Council of Insurance Regulators—P&C-1, pp. 10.40-10.42, 10.60, 20.10-20.52, 30.70-30.71, 40.07, 60.10-60.50, 67.10, 67.20-67.30, 70.10-70.21, 70.38, 80.10-80.20, and 99.10. **NOTE: Please use the 2011 edition that has been archived on the CAS Web Site for educational purposes.**

[Exam 6-US](#)

Actuarial Standards Board of the American Academy of Actuaries, Actuarial Standard of Practice, No. 20 was updated in September 2011 to "[Discounting of Property/Casualty Unpaid Claim Estimates](#)." Please use the new version.

Knowledge Statement C.1.i has been changed to: Exhibit of Premiums and Losses (Statutory Page 14).

NAIC SSAP 5R: The citation has been updated to: paragraphs 1-11, 24-26, and 30-31.

[Exam 8](#)

The Executive Council has increased the test time of Exam 8 from three hours to four hours.

Exam 9

The Executive Council has increased the test time of the May 2012 administration of Exam 9 **from three hours to four hours**.

Contingent immunization and BKM: The Syllabus and Examination Committees are aware that, unlike the eighth edition, the ninth edition of Investments by Bodie, Kane, and Marcus does not cover contingent immunization [Knowledge Statement B.3.d]. This concept will not be tested on the May 2012 exam.

Archives 2012

ANNOUNCEMENTS FOR 2012

1. Last Offering of Transitional Half-Exams 5A and 5B

The CAS introduced a new education structure in 2011. The following two transition rules included temporary credit for half of new Exam 5:

Credit in 2010	Credit in the 2011 Education Structure
Exam 5	Half of Exam 5 (section on Basic Techniques for Ratemaking)* and Online Course 1
Exam 6	Half of Exam 5 (section on Estimating Claim Liabilities)* and Exam 7 on Estimation of Policy Liabilities, Insurance Company Valuation, and Enterprise Risk Management

To receive full credit for new Exam 5 on Basic Techniques for Ratemaking and Estimating Claim Liabilities, the candidate must have had credit for both old (2010) Exams 5 and 6. At the time of transition, if a candidate has credit for only one of the required exams (either old Exam 5 or Exam 6), the candidate will be allowed to take just the part of the exam for which he or she is missing credit (i.e., either the Basic Techniques for Ratemaking section or the Estimating Claim Liabilities section of the new exam) in order to obtain credit for the new exam. This option was available in May 2011 and will be available for the last time in May 2012. If the candidate does not have credit for both halves of new Exam 5 at the end of the transition period, then the candidate would have to pass the full version of Exam 5 to receive credit.

2. New CERA Designation

In October 2011, the Treaty Board for the CERA Global Credential unanimously approved the CAS as an award signatory. The CAS may award the Chartered Enterprise Risk Analyst (CERA) credential to those who have fulfilled the following requirements:

- Meet all requirements for Associateship in the CAS
- Credit for CAS Exams 7 and 9
- Successful completion of the specific three-day ERM seminar, and
- Successful completion of the U.K. Enterprise Risk Management Specialist Technical Exam (ST9 exam)

Fellows of the CAS would be required to successfully complete the seminar and the ST9 exam.

The three-day seminar is tentatively scheduled for March 2012. Details will be posted in the Admissions/Exams section of the CAS Web Site as they are available. The seminar will cover ERM learning objectives tested in the ST9 exam in order to prepare candidates for successful completion of the exam.

The next administration of the ST9 exam will be held in April 2012. The ST9 syllabus is available on the Institute and Faculty of Actuaries Web Site (see <http://www.actuaries.org.uk/research-and-resources/documents/subject-st9-enterprise-risk-management-syllabus-2012-exams>). There will be a special registration process for those taking the ST9 exam to fulfill the CAS CERA requirements (in order to bypass the requirement to be a student or member of the Institutes and Faculty of Actuaries to sit for the exam). Details will be provided in the Admissions/Exams section of the CAS Web Site. The CAS registration deadline will be earlier than the deadline for Institute and Faculty students and members.

The global CERA Web Site (<http://www.ceraglobal.org/>) contains details about this international designation.

3. Exam Registration

Candidates may find online exam registration and related information in the “Exam Registration and Online Store” section of the CAS Web Site (also links from this *Syllabus*). Prior to completing an online application for Exams 3L, and 5-9, candidates must submit an Electronic Signature Authorization Form—details are available in the same section.

There is only one registration deadline for each exam. **No late registrations will be accepted.** The exam dates and registration deadlines are available in the “2012 CAS Examination Schedule” section. Please allow at least 10 working days for your mailed application to reach its destination. Whether payment is made by personal or company check, **it is the candidate’s responsibility to ensure that the application and fee are received by the stated deadline. Exceptions will not be made.**

4. Notice of Examinations

The CAS posts the *Notice of Examinations* for each exam session in the “Admissions/Exams” section of the CAS Web Site. The *Notice* contains important information for the exams as well as information on study aids and review seminars.

5. CAS Centennial Celebration—2014

In 2014, the CAS will celebrate its 100th anniversary. The CAS Centennial Steering Committee plans to host a grand commemoration in November 2014 during the CAS Annual Meeting in New York City. Because all members will be encouraged to participate in the centennial celebration, no Spring Meeting will be held in 2014. All new Fellows and Associates for 2014 will be formally recognized at the Annual Meeting that year.

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INTRODUCTION

Principles of the Casualty Actuarial Society for Basic Education

The primary purpose of the Casualty Actuarial Society (CAS) basic education process is to ascertain whether candidates for the CAS designations have satisfied CAS learning objectives. The CAS Board of Directors adopted the following principles on May 6, 2001.

1. Basic education will remain a cornerstone of the CAS.
2. The CAS will assure that its members have the knowledge of those areas needed to practice effectively in the broad and expanding range of property, casualty, and similar business and financial risks (general insurance).
3. The CAS is committed to a depth of knowledge of techniques associated with the broad range of property, casualty, and similar business and financial risks.
4. The CAS will provide the basic education necessary to meet qualification standards to sign statements of actuarial opinion for general insurance and related specialties in at least the U.S. and Canada.
5. The education process will provide a balance among theoretical concepts, practical applications, and business acumen, to prepare our members to deliver high-quality service to meet current and projected future needs of employers and clients.
6. The CAS will approve the syllabus and examination standards used in determining eligibility for CAS membership.
7. Demonstration of mastery of the skill sets required of members is critical to basic education.
8. The CAS is committed to maintaining self-study as one route for attainment of designations.
9. The CAS will pursue strong working relationships with academia and professionals in related fields.
10. The CAS will attract a pool of strong candidates from a variety of backgrounds to the actuarial profession.
11. The CAS supports the goal of developing a global shared foundation of actuarial education, including joint sponsorship of examinations where consistent with other principles.
12. The CAS, as an educator of general insurance and related specialties, will remain a significant contributor to the worldwide actuarial profession.

Syllabus Goals and Objectives

One of the primary objectives of the Casualty Actuarial Society (CAS) is the development of qualified professionals in the field of casualty actuarial science. The CAS conducts an educational and examination program for prospective members in order to achieve this objective. The syllabus goals and objectives are as follows:

1. To develop a general understanding of the social, political, regulatory, legal, economic, and financial environment of the business of property and casualty insurance and similar risk assessment as well as the historical development of that environment.
2. To develop a thorough understanding of the fundamental mathematical concepts applicable to solving insurance and similar risk assessment problems, and to develop a high degree of skill in their applications.

3. To develop a comprehensive understanding of the business of property and casualty insurance, including underwriting, claims, marketing, and finance, as well as how these functions are performed and interrelated.
4. To develop a working knowledge of property and casualty insurance policies and contracts.
5. To develop an expert knowledge of a broad range of techniques to solve problems and to develop the ability to discern the appropriateness of techniques for particular applications based on a knowledge of the underlying assumptions, strengths, and weaknesses.
6. To develop an expert knowledge of a broad range of relevant and standard actuarial practices in order to present a framework for the use of problem-solving techniques.
7. To encourage a sense of inquisitiveness and creativity toward problem solving in order to foster an appreciation of the art in actuarial science.

Note: The items in this *Syllabus* were chosen for their educational value. They are intended to expose the candidate to a wide range of information and to a variety of methods, opinions, and practices in the casualty actuarial field. Inclusion of material in the *Syllabus* does not imply that the CAS endorses the views, methodologies, or techniques therein.

Education and Examination System

The CAS vice president-admissions supervises the CAS education and examination system. The vice president-admissions is supported by the following four admissions committees:

CAS Education Policy Committee

The Education Policy Committee establishes the goals and objectives of the CAS education and examination system to ensure that the needs of the Society, its members, and its potential members are met. The committee also monitors the operations of the other educational and examination committees to ensure continued effectiveness.

CAS Syllabus Committee

The Syllabus Committee determines the scope and content of the *CAS Syllabus* and course of readings for CAS Examinations.

A chairperson supervises the committee that is composed of Fellows who represent a broad spectrum of CAS members including insurers, consultants, regulators, and academicians. At least one representative of the Canadian Institute of Actuaries (CIA) also serves on the committee; usually at least one of the representatives is a member of the CIA Education and Examination Committee. One or more members specialize in the material for each examination part. These specialists recommend changes to the *Syllabus*; however, recommendations must be approved by the entire committee.

The “Materials for Study” are reviewed regularly by members of the Syllabus Committee. Both short- and long-term goals for improvement are developed. Textbooks and articles may be designated for inclusion. If the committee determines that new study material needs to be developed or that existing material needs to be revised, the committee may commission the creation of Study Notes for inclusion. Every effort is made to develop material that is appropriate, relevant, up-to-date, concise, and well-written. Suggestions for improvement are always welcome and should be directed to the Syllabus Committee at the CAS Office address.

CAS Examination Committee

The Examination Committee organizes, manages, administers, and grades the CAS Examinations. The committee also establishes the standards to be achieved by successful candidates.

The chairperson supervises the committee and is responsible for the overall administration of the CAS Examinations. The chairperson is assisted by several senior committee officers with the title of general

officer. The committee is subdivided into Examination Part Committees, each headed by an examination part chairperson.

The committee work is similar for both jointly administered Exams 1/P, 2/FM, 3F/MFE, and 4/C and the CAS-specific Exams 3L and 5-9. The following provides details about the CAS-specific examinations:

- The responsibility for each CAS Examination is assigned to a part committee that writes, grades, and maintains the standards for that examination. Each part committee is assisted by two examination consultants who are CAS members and are experts on the material covered by that examination. The part committees are also assisted by a proofreader who concentrates on uniformity and grammar. In addition, some part committees are assisted by academic consultants who are independent experts from the academic community.
- Each examination is drafted by the responsible Examination Part Committee to test candidates' knowledge of the items listed in the "Materials for Study." The individual part committee, examination consultants, one of the Examination Committee general officers, the Examination Committee chairperson, and, in some cases, academic consultants review each examination to assure its quality.
- Every effort is made to ensure that the questions fall within the scope of the "Materials for Study." Complete coverage of all material is not practical for every examination every year. The goal is to produce examinations that contain representative, high-quality questions that test candidates' knowledge of the material. Trick questions are deliberately avoided, and the wording of each question is considered carefully to eliminate possible ambiguities. Preliminary versions of each examination are thoroughly reviewed in relation to all of these factors before the final examination is approved.

CAS Candidate Liaison Committee

The Candidate Liaison Committee strives to focus on issues of importance to candidates who are taking CAS Examinations. The committee serves as a direct point of contact for candidates to voice individual or group concerns regarding the education and examination process. It also provides a means for an exchange of information between candidates and the admissions committees via *Future Fellows*, a quarterly newsletter. Candidate representatives who are actively involved in the examination process serve as advisors to the committee.

2012 CAS BASIC EDUCATION SUMMARY

Associateship Requirements

Validation by Educational Experience

- VEE-Applied Statistical Methods
- VEE-Corporate Finance
- VEE-Economics

Online Courses

- Online Course 1 Risk Management and Insurance Operations (same as The Institutes Course CA1)
- Online Course 2 Insurance Accounting, Coverage Analysis, Insurance Law, and Insurance Regulation (same as The Institutes Course CA2)

Examinations

- Exam 1 Probability (same as SOA Exam P)
- Exam 2 Financial Mathematics (same as SOA Exam FM)
- Exam 3F Models for Financial Economics
- Exam 3L Models for Life Contingencies and Statistics
- Exam 4 Construction and Evaluation of Actuarial Models (same as SOA Exam C)
- Exam 5 Basic Techniques for Ratemaking and Estimating Claim Liabilities
- Exam 6 Regulation and Financial Reporting (Nation-Specific)

Course on Professionalism

Fellowship Requirements

Fellowship requires all Associateship requirements plus the following:

- Exam 7 Estimation of Policy Liabilities, Insurance Company Valuation, and ERM
- Exam 8 Advanced Ratemaking
- Exam 9 Financial Risk and Rate of Return

CERA Requirements

The CERA designation requires all Associateship requirements plus the following:

- Exam 7 Estimation of Policy Liabilities, Insurance Company Valuation, and ERM
- Exam 9 Financial Risk and Rate of Return
- Enterprise Risk Management and Modeling Seminar
- Exam ST9 of the Institute and Faculty of Actuaries (U.K.) on Enterprise Risk Management

Preliminary Actuarial Examinations administers the jointly sponsored Exams 1/P, 2/FM, 3F/MFE, and 4/C of the Canadian Institute of Actuaries, Casualty Actuarial Society, and the Society of Actuaries.

The Institutes administer the exams for Online Courses 1/CA1 and 2/CA2.

EXAMINATION RULES

A. Registration

Administration of Examinations

The CAS basic education structure has three Validation by Educational Experience (VEE) requirements, two online courses, nine examinations, and the Course on Professionalism. Exams 1/P, 2/FM, 3F/MFE, and 4/C are jointly administered by the CAS and the Society of Actuaries (SOA) through Preliminary Actuarial Examinations. The two online courses are available through The Institutes. Exams 3L and 5-9 and the Course on Professionalism are exclusively administered by the CAS. The Canadian Institute of Actuaries (CIA) cosponsors all the examinations except Exam 6-United States.

Filing of Applications and Deadlines

All candidates filing for an examination(s) must submit a signed application for each examination period. Both online registration and application forms are linked from the “Exam Registration” section of this *Syllabus*. Payment must accompany each application to be valid. ***Applications must be received by the registration deadlines*** stated in the “Examination Schedule” of this *Syllabus*. Please allow at least 10 working days for your mailed application to reach its destination. Whether payment is made by personal or company check, **it is the candidate’s responsibility to ensure that the application and fee are received by the stated deadline. Exceptions will not be made.** Send applications as follows:

Jointly Administered Exams 1, 2, 3F, and 4

Exams 1/P, 2/FM, 3F/MFE, and 4/C are administered by Preliminary Actuarial Examinations for the CAS, CIA, and SOA. Candidates must submit a signed application for each examination session or register online. Fees should be remitted in U.S. funds (or equivalent) by check, money order, or credit card (American Express, MasterCard, or Visa). Please note that payment in Canadian currency may slightly delay the processing of the application.

For the joint exams, the candidate’s letter of admission is also a tax receipt and should be retained after the exam if needed for tax purposes. Applications and online registration are linked from the “Exam Registration” section. Applications must be received by the published deadlines.

Mail application with check or money order to:

Preliminary Actuarial Examinations/SOA
P.O. Box 95600
Chicago, IL 60694-5600

Send application with credit card payment and all overnight deliveries to:

SOA/Preliminary Actuarial Examinations
475 N. Martingale Road, Suite 600
Schaumburg, IL 60173

Exams 3L, and 5-9

Candidates may submit examination registrations for Exams 3L, and 5-9 by mail or online. Applications must be received by the published deadlines. Candidates submitting a hard copy of their registration should mail them as follows:

Mail application with check or money order in U.S. funds or Canadian equivalent (payable to “Casualty Actuarial Society”) to:

Casualty Actuarial Society
P.O. Box 425
Merrifield, VA 22116-0425

Send application with credit card payment (Visa, MasterCard, or American Express) and all overnight deliveries to:

Casualty Actuarial Society
4350 N. Fairfax Drive, Suite 250
Arlington, Virginia 22203

Candidates submitting their registrations online for Exams 3L and 5-9 must pay by credit card. All credit card payments will be processed in U.S. funds. Prior to completing an online application, candidates must submit an Electronic Signature Authorization Form (ESAF). By signing the ESAF, candidates agree to be bound by the rules and regulations related to the examinations. It will also provide a signature of record for comparison to signatures on the individual examination envelopes. The ESAF is available in the “Exam Registration” section. Unless the candidate has a name change, the ESAF only needs to be submitted once. Candidates who intend to register online should submit their ESAFs at least one week prior to the exam registration deadline to allow for processing time.

Candidates will be sent an acknowledgment of receipt of their application within three weeks of the date that the application form was received at the CAS Office beginning February 1 for May Examinations and August 1 for October Examinations. This acknowledgment is the candidate’s receipt of exam fees paid. Please retain this acknowledgment for tax purposes if needed. **Candidates that have not received an acknowledgment prior to the registration deadline should contact the CAS Office or their accounting department to ensure that their applications reached the CAS Office.**

Online Courses 1 and 2

CAS Online Courses 1/CA1 and 2/CA2 are available through The Institutes. When candidates register for the individual online course, the fee includes one attempt at the exam. Before registering for the exam, candidates must obtain their Master ID number from the CAS—it will be required to register for the exam. After progressing through the online course, candidates arrange for their exam by contacting:

The Institutes, Customer Service
 720 Providence Road, Suite 100
 Malvern, PA 19355-3433
 Telephone: (800) 644-2101 or (610) 644-2100 ext. 6000
 E:mail:CustomerService@TheInstitutes.org
 CAS Online Courses Web Page at The Institutes Web Site: www.aicpcu.org/cas.htm

Name

Candidates must use their legal name on all examination registration materials and when corresponding with the CAS. Any change in name must be accompanied by acceptable documentation.

Fees

Examination fees must be paid each time a candidate registers for an exam. Payment options are described in a previous section, “Filing of Applications.” A \$20 surcharge will be assessed for all returned checks. The charts below show the examination fee schedules for 2012 at the time of publication. All fees are listed in U.S. dollars and are subject to change. Other fees that may apply include fees for change of center, refund, and/or a special exam center.

2012 Examination Fees

	Candidates	Full-Time Students
Exam 1/P (CBT)	\$200	\$200
Exam 2/FM (CBT)	\$200	\$200
Exam 3F/MFE (CBT)	\$275	\$220
Exam 3L	\$325	\$260
Exam 4/C	\$375	\$300
Exams 5*, 6, 7, 8, and 9	\$575	\$460
Online Courses 1 & 2 Retest†	\$295	\$295

Other Fees

Refund (Exams 3L and 5-9)	\$100
Change of Exam Center	\$60
Special Exam Center	\$60
CBT Rescheduling Fee between 30 days and 49 hours of appointment (paid directly to Prometric)	\$35
Online Courses 1/CA1 and 2/CA2: Contact The Institutes for fees that apply.	

*The half-exam fee for Exam 5 is \$325 (\$260 for full-time students).

†The first exam attempt is included in the \$525 Online Course fee.

Computer-Based Testing

Exams 1, 2, 3F, and 4

Exams 1/P, 2/FM, 3F/MFE, and 4/C are offered by computer-based testing (CBT). CBT provides candidates more frequent opportunities to take an exam within a standardized environment. Because there are distinctive processes and procedures for CBT, additional information is available under “Exam Rules” on the Be An Actuary Web Site (<http://www.beanactuary.org/exams/rules/?fa=exam-rules>) that includes the sections on Identification and Calculators; Canceling or Changing an Appointment; Exam Fees; Procedures on Exam Day; Technical Difficulties and Closings; and Confidentiality and Discipline. The rules and procedures provided on the CBT Web page are part of the CAS examination rules.

Online Courses 1 and 2

The exams for Online Courses 1/CA1 and 2/CA2 are also offered by CBT. Because there are distinctive processes and procedures for CBT, additional information is available on The Institutes Web Site. The rules and procedures provided on The Institutes Web Site related to Online Courses 1/CA1 and 2/CA2 are part of the CAS examination rules.

Exam 1 Fee Reimbursement Program in the U.S.

The Joint CAS/SOA Committee on a Diversity Recruiting sponsors a program to reimburse qualified minority candidates for their Exam 1/P fee if they pass the exam on their first or second attempt. Eligible candidates are members of specified groups that are underrepresented in the actuarial profession in the United States, including African-Americans, Hispanics, and Native North Americans who are sitting for actuarial exams. The Exam 1/P reimbursement application is available in the “Diversity Programs” section of the actuarial career Web site at www.BeAnActuary.org.

Fee Discount Program in Qualified Countries

The CAS and SOA sponsor a program to provide financial relief to candidates of qualified countries. Eligible candidates must be current full-time residents of a qualified country and verify that they are personally paying for exam fees and study materials without assistance from employers or other entities. Candidates must write their exams in a qualified country. Information, including a list of qualified countries and the application, is available in the “Admissions/Exams” section of the CAS Web Site.

Examination Centers

CAS examination centers are listed in the “Exam Registration” section. Centers are determined by the number of candidates near a center and the availability of proctors. Special examination centers may be arranged at the discretion of the CAS or Preliminary Actuarial Examinations if the request is received by the registration deadline. The additional fee for a special center is \$60. Candidates will be sent the exact location of their examination center at least three weeks before the examination. Examinations by computer-based testing are administered at established test centers. The Prometric Web Site (<http://www.prometric.com/SOA/default.htm>) contains a list of the CBT centers.

Letter of Admission (Only for Paper-and-Pencil Versions of Exams 1, 2, 3F, and 4)

For the paper-and-pencil administrations of Exams 1/P, 2/FM, 3F/MFE, and 4/C, candidates will be sent an automated letter of admission upon completion of their registration. The letter of admission indicates the exam for which the candidate is registered and contains the candidate number as well as the exam center name and number. **This letter of admission must be brought to the examination center.** A candidate may reprint his or her ticket of admission/acknowledgement letter at any time by going to <http://www.soa.org/education/exam-req/exam-day-info/edu-letter-admin.aspx> and clicking on “Print Your Acknowledgement Letter.” Candidates should retain this letter as a receipt if needed for tax purposes.

Change of Center

Details for changing a CBT center for Exams 1/P, 2/FM, 3F/MFE, and 4/C are provided under “Canceling or Changing an Appointment” in the “Exam Rules” section of the Be An Actuary Web Site (<http://www.beanactuary.org/exams/rules/?fa=canceling-or-changing-an-appointment>). For all exams not administered by CBT, any registered candidate who requests a change in examination center must pay a change-of-center fee. No requests will be accepted after the registration deadline. If a request for a change of center occurs, every effort will be made to have the candidate’s records and supplies on hand at the appropriate center in time for the examination. If this effort fails, however, the administering organizations are not responsible. If either a candidate’s registration and fees, or request for change of center are received so late that it is not feasible to arrange for the candidate to write the examination, the fees will be refunded in full. The administering organizations are not responsible for difficulties caused by postal service delays or inadequate postage.

Details for changing a CBT center for exams for Online Courses 1/CA1 and 2/CA2 are available on The Institutes Web Site (<http://www.aicpcu.org/cas.htm>).

Languages Other Than English

Exams 1, 2, 3F, and 4

Examination questions and instructions will be displayed, and examinations administered, in English except in Canada where the examinations will be displayed in both French and English.

Exams 3L and 5-9 and Online Courses 1 and 2

Exam questions and instructions will be printed, and exams administered, exclusively in English. Candidates must submit written responses in English; non-English responses will not be graded with the following exception: Should a candidate for an exam jointly sponsored by the Canadian Institute of Actuaries wish to respond to any or all of the constructed response (essay) questions in French, advanced notice must be provided to the CAS Office when applying to write the exam. Provided such advanced notice was received and a suitable translator is available from the Canadian Institute of Actuaries, responses submitted in French will be translated into English by qualified translators and graded exclusively in translation. All translations will be literal translations from French to English. If advanced notice has not been provided, non-English responses will not be graded. If a suitable translator cannot be engaged before the date of the exam, the candidate will be notified. The CAS cannot guarantee the accuracy of any translation. Appeals based upon errors in translation of candidates’ responses will not be considered. Grade reports for exams requiring translation may be delayed.

Special Arrangements for Candidates with a Disability

A candidate with a formally diagnosed disability who needs special testing arrangements must submit a written request for each examination that the candidate intends to write to Preliminary Actuarial Examinations/SOA for Exams 1/P, 2/FM, 3F/MFE, and 4/C; to the CAS for Exams 3L and 5-9; and to The Institutes for the two online courses. Documentation of the disability (e.g., physician’s statement, diagnostic test results), as well as the need for special arrangements, are required of each candidate. Previous accommodations given to the candidate in an educational program or work setting may be considered. Requests for special arrangements and supporting documentation must be submitted at the applicant’s expense at least two weeks prior to the registration deadline for Exams 1-9; and prior to the first day of the testing window for exams for Online Courses 1/CA1 and 2/CA2.

Refunds

Exams 1/P, 2/FM, 3F/MFE, and 4/C

Preliminary Actuarial Exams/SOA does not offer refunds for examinations. No part of a fee paid to the Preliminary Actuarial Exams/SOA for examination registration will be refunded or transferred to a later

exam period should the candidate not appear for the exam.

The Preliminary Actuarial Exams/SOA does recognize that events may occur that are outside a candidate's control. In those cases, there are two options that may be available:

- Rescheduling Options for CBT: Because computer-based exams are administered over several days, candidates will continue to have the option to reschedule their test appointment within the same testing window provided the request is made by noon of the second business day before the scheduled appointment, and also provided there is a seat available. To reschedule a CBT appointment, candidates must follow the directions provided on the CBT Web Page (<http://www.beanactuary.com/exams/cbt.cfm#appt>).
- Emergency Situations. Preliminary Actuarial Exams/SOA recognizes that unforeseen emergencies may occur that directly influence a candidate's ability to take an exam on an appointed day. Preliminary Actuarial Exams/SOA will consider these situations on a case-by-case basis. Candidates finding themselves in such a situation should contact SOA Customer Service at customerservice@soa.org.

Online Courses 1 and 2

The fee for Online Courses 1/CA1 and 2/CA2 includes one attempt at the exam by CBT. No refunds for a course are provided once the candidate has accessed the online course. If the candidate decides not to access the online course after payment has been made, the candidate may submit a request for a refund. The request must be submitted to Customer Service at The Institutes.

Any candidate who registered for a course exam and subsequently decides not to take the exam may receive a refund for the exam portion of the course fee (\$190) only by doing both of the following:

- Cancel the appointment prior to the third day preceding the exam at the test center as described in the "Canceling or Changing an Appointment" section under "Exam Rules" on the Be An Actuary Web Site (<http://www.beanactuary.org/exams/rules/?fa=canceling-or-changing-an-appointment>).
- Submit a refund request to Customer Service at The Institutes (CustomerService@TheInstitutes.org) that must arrive prior to the third day preceding the exam.

Exams 3L and 5-9

Any candidate who submits an application for Exams 3L or 5-9 and subsequently does not write the examination should submit a written request for an examination fee refund. This request must reach the CAS Office by the refund deadline stated in the "Examination Schedule" of this *Syllabus*. Refund requests may be sent via e-mail to refund@casact.org or by fax to (703) 276-3108. Late requests will not be considered. A \$100 administrative fee per examination will be assessed on all refunds. Change-of-center fees, special center fees, and other additional fees will not be refunded in any case. Refunds will be issued one month after the refund deadline. Refunds are issued in the manner that fees were paid (i.e., by credit to a bank card or by check to an individual or company). Fees cannot be transferred from one exam session to another.

B. The Examination

Introduction

The examinations for admission to the Casualty Actuarial Society are designed to establish the qualifications of candidates. The Examination Committee creates exams that follow guidelines developed by the Syllabus Committee. Complete coverage of all readings listed in the *Syllabus* is not practical for every exam every year. The goal is to produce exams that contain representative, high-quality questions that test candidates' knowledge of topics that are presented in the learning objectives. Thus, the candidate should expect that each exam will cover a large proportion of the learning objectives and associated knowledge statements and syllabus readings, and that all of these will be tested at least once over the course of a few years.

The exam questions will be based on the published learning objectives and supporting knowledge statements. It is intended that the readings, in conjunction with the material on the lower numbered examinations, will provide sufficient resources to allow the candidate to perform the learning objectives. The exams will test not only candidates' knowledge of the subject matter, but also candidates' ability to apply that knowledge.

The Institutes create exams for the online courses that follow the learning objectives contained in the individual courses.

Order of Examinations and VEE Topics

In the development of the syllabus readings and exam questions, often it is assumed that candidates are familiar with material covered on some of the earlier examinations. Therefore, it may generally be beneficial to take exams in numerical order. There are, however, circumstances when another order might be more appropriate. For example, a candidate may wish to study an exam that is closely related to his or her current work.

VEE topics are not prerequisites to taking actuarial exams and may be fulfilled independently of the exam process (i.e., prior to or concurrent with taking actuarial exams). The following insights on VEE topics, however, may be helpful. VEE-Applied Statistical Methods will help strengthen candidates' statistical skills and completing it prior to taking Exams 3 and 4 will make these exams easier to understand. VEE-Economics and VEE-Corporate Finance will help strengthen candidates' understanding of managerial decision making and completing these topics prior to taking Exam 9 will make this exam easier to understand.

To help candidates decide which exam to take, the following chart indicates which exams assume knowledge of material found on prior exams. Most candidates will find it easiest to study for an exam after studying for all of the exams listed in the "prior knowledge" column.

Exam or VEE Topic	Assumes Prior Knowledge from the Following Exam(s)
VEE-Applied Statistical Methods	None
VEE-Corporate Finance	None
VEE-Economics	None
Online Course 1/CA1	None
Online Course 2/CA2	None
Exam 1/P	None
Exam 2/FM	None
Exam 3F/MFE	Exams 1/P and 2/FM
Exam 3L	Exam 1/P
Exam 4/C	Exam 1/P
Exam 5	Exams 1/P and 2/FM

Exam 6	Exams 1/P and 5 and Online Course 2
Exam 7	Exams 1/P, 2/FM, and 4C
Exam 8	Exams 1/P, 2/FM, 3, 4/C, and 5
Exam 9	Exams 1/P, 2/FM, 3, 4/C, and 5

Notes on Order of Examinations

- Exams 3F/MFE, 3L, 4/C, and 8 make extensive use of Exam 1/P material. Exams 5 and 9 assume an understanding of Exam 1/P material.
- Exam 5 is approachable without detailed knowledge of the material on Exam 2/FM. A candidate who has studied this material, however, may gain a deeper understanding of the material on Exam 5 and its foundations.
- Many candidates find it easier to study for the more mathematical Exams 1-4 when they are not too far removed from college math.
- Exam 4/C covers the theory of credibility. Credibility theory is applied in Exam 5. Candidates who have mastered credibility theory in Exam 4/C may find its application more intuitive on Exam 5. On the other hand, candidates who have experience applying credibility on Exam 5 may find the theory on Exam 4/C easier to understand.
- There is a great deal of thematic overlap among Exams 6, 8, and 9. Candidates may find their understanding of whichever one they study last enhanced by the material learned on the other two.

Requirements for Admission to Examination Center

To be admitted into an examination center, each candidate must present a positive identification with a signature and a photograph (e.g., driver's license, passport, etc.). If a photo ID is not available, the candidate must present *two* forms of identification with a signature, with at least one form containing a physical description (height, weight, hair color, eye color, etc.). Each candidate will be required to sign in at the examination center. A candidate who does not present positive identification or who refuses or is unable to provide a matching signature will not be permitted to write the examination.

For examinations offered by computer-based testing, each candidate must present a valid government-issued photo identification that includes the candidate's signature (details are available under "Identification and Calculators" in the "Exam Rules" section of the [Be An Actuary Web Site](http://www.beanactuary.org/exams/rules/?fa=identification-and-calculators) (<http://www.beanactuary.org/exams/rules/?fa=identification-and-calculators>)—and on The Institutes Web Site for exams for the two online courses). For the paper-and-pencil administrations of Exams 1/P, 2/FM, 3F/MFE, and 4/C, candidates also must present a valid letter of admission that will be sent by Preliminary Actuarial Examinations/SOA.

Candidates should arrive at the examination center at least 30 minutes before the scheduled exam time. Candidates may not leave until two hours after the start of the examination. For Exams 3L and 5-9, candidates may not leave during the last 15 minutes of the examination.

Conduct of Examinations

The examinations are recorded exclusively in writing (except for exams that are administered by computer-based testing). Except as is noted in the following paragraphs, no books, papers, typewriters, slide rules, or electronic or mechanical aids for computation of any kind may be brought into the examination room by candidates, nor may any candidate communicate with, or obtain any assistance from, any other candidate during the examination. Candidates must respond to constructed response (essay) questions in English unless advance notice is given (see "Languages Other than English" under "Examination Rules—Registration" above). Examination answer sheets are not returned to candidates.

For Exams 3L and 5-9, a candidate wishing to obtain his or her own examination booklet and scrap paper subsequent to the examination must bring a self-addressed stamped envelope to the examination center. The recommended minimum postage is \$2.87 for domestic mail in the U.S. For Exams 3L and 5-9,

approximately one week after all exams have been completed, the exam will be posted in the “Admissions/Exams” section of the CAS Web Site.

Calculators

Electronic calculators will be allowed in the examination room for all examinations. Only the calculators listed below may be brought into the examination room. Books, papers, computers, or other electronic devices may not be brought into the examination room. Candidates may use the battery- or solar-powered models of the following Texas Instruments calculators:

- BA-35
- BA II Plus
- BA II Plus Professional
- TI-30Xa
- TI-30X II (IIS solar or IIB battery)
- TI-30XS MultiView (or XB battery)

Candidates may use more than one of the approved calculators during the examination. **For those using the BA II Plus, BA II Plus Professional, TI-30X II (IIS solar or IIB battery) or TI-30XS MultiView (or XB battery) models, candidates will be required to show examination proctors that the memory has been cleared prior to the start of the examination. For the BA II Plus and BA II Plus Professional, clearing will reset the calculator to the factory default settings.**

Calculator instructions cannot be brought into the examination room. During the examination, the calculator must be removed from its carrying case so the proctor can confirm it is an approved model. **Any unauthorized calculator brought to the examination center will be confiscated for the duration of the examination. Candidates using a calculator other than the approved models will be subject to examination disqualification and other disciplinary action.**

Candidates may purchase calculators from stores or directly from Texas Instruments: telephone: (800) 842-2737; Web site: www.ti.com.

It is the candidate’s responsibility to see that the calculator used during the examination is in good working order. For CAS Exams 3L and 5-9, supervisors will have a spare approved calculator available for a candidate whose calculator malfunctions. It is not to be distributed to a candidate without a calculator or whose unauthorized calculator has been confiscated.

Examination Discipline

Candidates must not give or receive assistance of any kind during the examination. Any cheating, attempt to cheat, assisting others to cheat, participating therein, or engaging in such improper conduct as listed below is a serious violation and will result in the CAS disqualifying the candidate’s paper and other disciplinary action as may be deemed appropriate. Candidates have agreed in their applications for examination to be bound by the rules and regulations governing the examinations.

Examples of improper conduct include but are not limited to:

1. Gaining access to examination questions before the examination or aiding someone else to do so.
2. Using an unauthorized calculator (as defined in the *Syllabus*) or other mechanical aid that is not permitted.
3. Looking in the examination book before the instruction to begin is given.
4. Marking or otherwise writing on the examination book or answer sheet before the instruction to begin is given.
5. Making any changes, additions, deletions, or otherwise marking, erasing, or writing on the examination book or answer sheet after the time for the examination has expired.
6. Having access to or consulting notes or books during the examination.
7. Looking at or copying from another candidate’s paper.
8. Enabling another candidate to copy from one’s paper.

9. Talking or otherwise communicating with another candidate during the examination.
10. Disturbing other candidates during the examination.
11. Consulting other persons outside the examination room during the examination.
12. Copying questions, answers, or answer choices to take from the examination room.
13. Taking an examination book from the examination room.
14. Taking an examination for another candidate.
15. Arranging to have another person take an examination for the candidate.
16. Threatening or physically or verbally abusing a supervisor or proctor responsible for curbing or reporting improper conduct.
17. Disclosing the contents of an examination to any other person prior to the examination's release. (For CAS Exams 3L and 5-9, this would generally apply to the day when the examination is administered.)
18. Presenting false information on an examination application.
19. Failing to remain in the examination room for a minimum of two hours during the examination [for examinations with this requirement].
20. Failing to follow other examination instructions.
21. Accessing or using a communication device (PDA, cell phone, etc.) during the exam or while at the exam site.

The CAS Examination Committee, or its designee, will investigate any irregularity or suspected violation of the rules involving the examination process, and a determination will be made regarding the matter. Where there is a determination to invoke a penalty, the candidate is advised by letter. In the case of a candidate who is a member of the CAS, the candidate's conduct will be reported to the Actuarial Board for Counseling and Discipline (ABCD) or to the Canadian Institute of Actuaries (CIA) if the final penalty invoked is more than disqualification of the examination.

Candidates for the CAS Examinations are expected to follow the rules and procedures included in this *Syllabus*, the *Notice of Examinations*, and the "Instructions to Candidates" printed on their examination booklets as well as announcements made by the supervisors at the examination locations. All candidates, on their applications for examinations, are required to read and sign the following statement: "I have read the rules and regulations concerning the examination(s) for which I am applying and agree to be bound by them. I also agree that the results of any examination(s) which I take, and any action taken as a result of my conduct may, at the sole discretion of the Casualty Actuarial Society [and/or the Society of Actuaries for jointly administered exams], be disclosed to any other bona fide actuarial organization that has a legitimate interest in such results and/or actions."

The CAS may, at its sole discretion, disclose to any other bona fide actuarial organization having a legitimate interest, information on the identity of candidates determined to have committed a serious examination violation (those for which the penalty is greater than the simple disqualification/nullification of the examination), and the specific penalties imposed on those candidates.

If an actuarial organization with which the CAS has a working relationship (such as the Society of Actuaries) invokes a penalty against a candidate for improper conduct during an examination for which the CAS is not a joint sponsor, the CAS will invoke the same penalty for all CAS-sponsored examinations. If the CAS takes any disciplinary action, it will notify the other actuarial organizations of that action.

These standards may seem stricter than those which candidates are accustomed to in other examination environments. The CAS maintains these strict standards because the examinations are such a significant part of a candidate's career. Therefore, the equitable administration of the examinations and enforcement of the highest standards of conduct cannot be emphasized too strongly.

Candidates may obtain a copy of the full CAS Policy on Examination Discipline by sending a written request to the CAS Office.

Computer-Based Testing

The Policy on Examination Discipline is the same for those taking exams by computer-based testing or in the traditional paper-and-pencil format. There are some unique rules for the CBT administration that are available under “Confidentiality and Discipline” in the “Exam Rules” section of the Be An Actuary Web Site (<http://www.beanactuary.org/exams/rules/?fa=confidentiality-and-discipline>) for Exams 1/P, 2/FM, 3F/MFE, and 4/C; and on The Institutes Web Site for Online Courses 1/CA1 and 2/CA2. If there is a discrepancy between specific rules for the traditional paper-and-pencil exam administration and computer-based testing, the computer-based testing rules will govern.

Multiple-Choice Questions

Exams 1-4 consist entirely of multiple-choice questions; other CAS examinations may have a section of multiple-choice questions. Each multiple-choice problem includes five answer choices identified by the letters A, B, C, D, and E, only one of which is correct. For examinations administered by computer-based testing, candidates should click on the appropriate answer. For all other exams, a separate answer sheet provides a row of five ovals for each problem, identified with the letters A, B, C, D, and E, corresponding to the five answer choices. After deciding which answer is correct, candidates should blacken the oval that has the same letter as the appropriate answer. Since the answer sheets are scored by optical scanning equipment, a Number 2 pencil must be used to blacken the ovals. It is important that only one oval be blackened for each question.

Exams for the two online courses will consist entirely of multiple-choice questions. Each multiple-choice problem includes four answer choices identified by the letters A, B, C, and D, only one of which is correct. For exams administered by computer-based testing, candidates should click on the appropriate answer. For all other exams, a separate answer sheet provides a row of four ovals for each problem, identified with the letters A, B, C, and D, corresponding to the four answer choices. After deciding which answer is correct, candidates should blacken the oval that has the same letter as the appropriate answer. Since the answer sheets are scored by optical scanning equipment, a Number 2 pencil must be used to blacken the ovals. It is important that only one oval be blackened for each question.

Guessing Adjustment

For Exams 1/P, 2/FM, 3F/MFE, and 4/C, as well as the exams for Online Courses 1/CA1 and 2/CA2, no guessing adjustment is made to candidates' scores. Therefore, candidates will maximize their scores on these examinations by answering every question. On Exams 3L and 5-9, multiple-choice questions are scored in such a way that there is no advantage or disadvantage to be anticipated from guessing answers in a purely random fashion as compared with omitting the answers entirely. No additional points will be given for multiple-choice questions left blank, but one-quarter of the point value for each question will be deducted for each incorrect answer.

Lost Examinations

The CAS—or its designee—is not responsible for lost or destroyed examinations. In the case where an examination is lost or destroyed, the examination fee will be refunded. The CAS and other organizations that jointly administer and/or jointly sponsor CAS Examinations will assume no other obligation and candidates must take the examinations with this knowledge. The only exception to this policy is for the paper-and-pencil version of multiple-choice Exams 1/P, 2/FM, 3F/MFE, and 4/C. Whenever reasonably possible, Preliminary Actuarial Examinations/SOA will make use of a candidate's examination book to reconstruct the answers selected by the candidate. Therefore, candidates may wish to circle or otherwise clearly indicate their answer choices in the examination books. However, additional time in the

examination period will not be given for candidates to do this. If a candidate receives a passing grade as a result of the review of the examination book, the examination fee will not be refunded. For Online Courses 1/CA1 and 2/CA2 that are administered by The Institutes, the policy of The Institutes will apply.

C. Grades and Accreditation

Defective Questions

Occasionally, through error or because of varying interpretations, a question on an examination is found to be ambiguous or defective. If a candidate believes a question is ambiguous or defective, he or she should bring this to the attention of the Examination Committee in writing within two weeks after the examination date. The candidate must submit this correspondence to Preliminary Actuarial Examinations/SOA for Exams 1/P, 2/FM, 3F/MFE, and 4/C; to The Institutes for the two online courses; or to the CAS Office for Exams 3L and 5-9. The correspondence should include detailed reasons why the question is believed to be ambiguous or defective. In addition, statistics are calculated on each test item to determine how well the candidates answered the question. The statistics can indicate that a question may be faulty and the question will be reviewed even without a candidate writing.

The CAS Examination Committee, Preliminary Actuarial Examinations/SOA, and/or The Institutes, as appropriate, will investigate all questions brought to their attention in this manner. Correspondence that does not reach these organizations within two weeks after the date of the examination will not be considered in the grading process.

Any multiple-choice question found to be defective is carefully examined to determine the most reasonable way to correct the situation. In some cases, the question is discarded, leaving scores and rankings as they would have been if the defective question had not been asked. In other cases, more than one answer for a multiple-choice question is given credit for being correct.

CAS Examination Processing

Computer-based tests are administered and scored according to computer-based testing methodologies. Although the multiple-choice exams that are administered exclusively by paper-and-pencil have a process that is similar to the description below, this section and the next, “Grading of Examinations: A Timeline,” provide details about CAS-specific Exams 5-9.

Examination papers are sent to the CAS Office upon completion of the examination. The CAS Office prepares the examinations for the grading process. Approximately one week after all examinations have been completed, the examination and a preliminary list of multiple-choice answers will be posted in the “Admissions/Exams” section of the CAS Web Site. This is intended to assist candidates and the Examination Committee in determining whether they believe a question is ambiguous or defective.

Grading of Examinations: A Timeline

Week 1

After the examinations are administered, proctors return the exam packages to the CAS Office. Staff members log in each exam. Signatures are verified and the candidate numbers are checked against the proctor’s report. As each envelope is opened the candidate’s number must be checked against the number on the short answer card (both the written number and the coded number) and on all the essay sheets. The short answer cards are prepared for scanning and the essay sheets for all the candidates must be sorted so that individual questions can be copied for the graders.

Week 2

Constructed response (essay) question responses are sent to a vendor to be reproduced. Short answer cards are scanned twice and output is compared to ensure accuracy. Random checks are made of each

series of cards to make sure the scanner is working properly. When the essay sheet copies are received, copies of candidate responses are sent to the individual graders. Any comments on ambiguous or defective questions are forwarded to the graders, exam part chair, and the general officer of the exam series for review.

Weeks 3 and 4

Committee members review candidate comments about possibly defective questions and decide how they will be handled in the grading process. Discussions on the best course of action are often a very time-consuming part of the grading process.

Copies of responses to each constructed response question on the exam are sent to two graders. Some graders are given more than one question to grade. There can be 500 to more than 1,000 answer sheets for each grader to evaluate for a single question. A suggested answer key exists for each question, but alternative solutions may be correct, and the grader must be open to different approaches to a problem. About two dozen responses are graded and then the results are compared. The grading partners will establish a consistent grading scale and then evaluate the solution key. Consistency and accuracy are the most important factors in grading the responses. After looking at hundreds of papers, it is possible that a grader could slightly shift focus (either harder or easier). To minimize the chance of this happening the graders will begin grading at different points on the candidate list, then when the two grades are compared any significant differences will be checked. Each grader prepares a computer file with each candidate's number and the score for each question.

Week 5

The part chair holds the grading session with the graders. The first step is running the data through a standard grading program, verifying the data, and noting any significant discrepancies. For each candidate and each question the scores of each grading partner must be within a prescribed tolerance. If the scores do not fall within this tolerance, the partners must discuss the candidate's answer sheet and come to a decision on what the point value should be. When all the questions have been reconciled to the required tolerance, the scores are totaled and a tentative pass score is selected based on the pass mark panel's recommendation, various statistics, and guidelines.

This triggers the second round of reconciliation. Any candidates who have scores within a certain number of points from the tentative pass score will have all of their answers reconciled completely. This gives an exact score for any candidate near the passing score. The scores for any candidates who are close to passing will be checked manually as well. The committee members will then look at the statistics one more time and make a final recommendation for the passing score.

Weeks 6 and 7

After the grading session, the part chair will create and submit a report to the general officer of the exam series and the Examination Committee chairperson. In the report, the part chair recommends a passing score, gives a detailed analysis of the exam, and notes any unusual questions or situations that required special handling. The chairperson and general officer hold a teleconference with the vice president–admissions and a representative from the Canadian Institute of Actuaries to discuss all of the exams from the series and to finalize the passing scores.

Week 8

After the passing score has been approved by the vice president–admissions, the data is verified and released to the CAS Office to update each candidate's record, post a list of passing candidate numbers on the CAS Web Site, and send the grade reports to candidates.

Determination of the Pass Mark

The goal of the examination systems of the CAS is to pass all candidates who have demonstrated adequate knowledge of the syllabus and to fail those candidates who have not. The objective of the examinations is to evaluate candidate performance using criteria for demonstrating adequate knowledge

that remain constant throughout the lifetime of the exam series. Pre-set pass marks (e.g., a candidate will pass if he or she answers x percent of the questions correctly) are counter to this philosophy. The examinations are meant to measure the candidate's level of achievement of the required learning objectives and their required level of capability of accomplishing specified learning outcomes.

Multiple-Choice Test Items

As part of the input to the pass mark determination process for the multiple-choice exams that are not offered by computer-based testing, a modified Angoff passing score study is performed where a panel of experts in the subject material is convened to review the examination. This is a common testing and measurement technique. Each expert is asked to review each question in the examination, and assess the difficulty of that question. More specifically, they are asked to estimate the likelihood that a candidate with minimum adequate knowledge competency would answer the question correctly. The sum of these probabilities, averaged across the panel of experts, gives a preliminary estimate of the pass mark.

The estimated pass mark resulting from the modified Angoff passing score study is compared to and balanced with the actual performance statistics on the exam in finalizing the pass mark. The effects of any particularly difficult questions are also factored into the determination of the final pass mark.

Computer-based tests are administered and scored according to computer-based testing methodologies.

Constructed Response Test Items

For CAS examinations consisting in whole or in part of constructed response items (written-answer or essay test items), the assessment process is somewhat different. Before the exam is administered, a pass mark panel reviews the exam and assesses it based on how the panelists think a minimally qualified candidate will perform based on a predetermined definition of the minimally qualified candidate. This process follows the same basic technique used for multiple-choice exams as described above. Based on this assessment, an expected pass mark is set.

Following the administration of each exam, responses to each constructed response item are graded simultaneously by two graders who must reconcile their techniques and grades. When all responses have been scored, the part committee chooses a preliminary pass mark based on the results of the pass mark panel augmented by actual performance of the current candidates versus historical performance of previous candidate cohorts. Candidate papers with scores close to the preliminary pass mark are re-graded to ensure correct and consistent scoring.

The part committee then determines the tentative pass mark by again balancing actual performance statistics against minimum adequate knowledge while taking into account other factors such as time pressure situations that may have occurred on some questions. Because the level of difficulty for each examination may vary from year to year, each part committee collects extensive data to ascertain the level of difficulty of its examination. The part committee compares the performance of the present year's candidates to the performance of candidates from prior years. Appropriate recognition is given to any peculiarities that may appear in connection with the answers to any question on an examination despite all the care taken in setting the examination questions.

With the use of content-based pass marks, fluctuation in the pass rate from session to session is expected. Although the percentage of candidates passing will vary from year to year, those candidates demonstrating the required level of competence with the material will pass.

A recommended pass mark is reached by consultation among the part chairperson, the general officer overseeing that examination, and the Examination Committee chairperson. Any significant deviations from the a priori pass mark set by the pass mark panel are explored at this time. The recommended pass mark and explanations for deviations from the a priori pass mark and any abnormal passing percentages are submitted to the vice president-admissions who approves the final pass mark. Upon approval by the vice president-admissions, the final exam statistics are forwarded to the Executive Council.

After the pass mark is finalized, each candidate is assigned a score. Scores of 0 to 5 are assigned to candidates who do not pass. On this scale, each interval is 10 percent of the pass mark. For example, a

grade of 5 means failing with a mark of at least 90 percent, but less than 100 percent, of the pass mark. A grade of 0 means that the candidate's score is less than 50 percent of the pass mark. Candidates at or above the passing mark receive a grade of Pass.

The CAS releases the pass scores for Exams 3L and 5-9 after the appeals deadline for the specific exam session. It is posted in the "Admissions/Exams" section of the CAS Web Site. The purpose of releasing the pass scores is to help candidates prepare for future exam sittings. The 75th and 95th percentile scores are also released for each exam. These two key statistics indicate the performance level achieved by the better prepared candidates on the exam. Raw scores are not provided to candidates.

Examination Results

Examination results are available approximately eight weeks after the examination date. After exam results are received at the CAS Office, a list of passing candidate ID numbers will be posted in the "Admissions/Exams" section of the CAS Web Site between 3:00 and 3:30 p.m. Eastern time. Individual statements of examination results generally are sent to candidates on the day that they are posted on the CAS Web Site.

For Exams 3L and 5-9, passing candidates are informed that they passed the exam, but they are not given a numeric score. Candidates with scores of 0 to 5 are informed of the score. Several weeks later, a list of the names of all passing candidates is posted on the CAS Web Site. Requests for reprints of individual grade reports will be accepted starting two weeks after the date that results were released.

To preserve candidate confidentiality, in the event of a lost or misplaced candidate ID number, the candidate ID number will be mailed to the candidate upon request. Under no circumstance will a candidate number be given over the telephone or by e-mail.

Computer-Based Testing

For some of the examinations administered by computer-based testing, an unofficial pass/fail result will be displayed on the computer screen at the conclusion of the examination and, in most CBT centers, a printed copy of the unofficial pass/fail result will be available from the proctor in the administrative area outside the testing room. For all CBT exams, the official grade and decile scores will be available approximately eight weeks after the exam administration.

Online Courses 1 and 2

The exams for Online Courses 1 and 2 are offered by computer-based testing. As noted above, an unofficial pass/fail result will be displayed on the computer screen at the conclusion of the exam. When the official grades have been processed, candidates will receive an e-mail from The Institutes stating that their grades are available. Candidates may then log into their account on The Institutes Web Site (www.TheInstitutes.org) to access their grades. The grade report for each candidate will show the candidate's overall score on the exam in ten point increments (e.g., 60 to 69%, 70 to 79%, and so on). It will similarly show the candidate's performance by assignment using those same ten point increments. Numeric scores are not released. Once grades have been released, The Institutes will send a copy of the grades directly to the CAS Office to be added to the candidates' admissions records. The CAS will post the list of passing names approximately two weeks later.

Analyses for Exams 3L and 5-9

Candidates for Exams 3L and 5-9 who did not pass will automatically be sent an analysis of their examination with the grade notification. The analysis of an examination is computer-generated. Actual points received for multiple-choice questions will be displayed. For constructed response test items, ranges will be given for the actual score. This information is intended to provide the educational guidance that most candidates desire. Copies of the exam analyses will not be provided after the appeals deadline.

Appeals for Exams 3L and 5-9

Multiple-Choice Questions

If a candidate believes that a multiple-choice question is ambiguous or defective, he or she should bring this to the attention of the Examination Committee in writing within two weeks after the examination date. In order to aid the candidate, preliminary answer keys for multiple-choice questions will be available the week following the examinations. The candidate may submit comments to the CAS Office by mail, fax, or e-mail. The correspondence should include detailed reasons why the question is believed to be ambiguous or defective. (In addition to candidate comments, statistics are calculated on each problem to see how well the candidates answered the question. The statistics can indicate that a question may be faulty and the question will be reviewed even without a candidate writing.) The CAS Examination Committee will investigate all questions brought to its attention in writing. To be considered in the grading process, correspondence must reach the CAS Office **within two weeks of the date that the exam was administered**. The decision of the Examination Committee chairperson is final.

No appeals based on ambiguous or defective questions will be considered after these deadlines. After grades are released, the only appeal permitted on multiple-choice questions will be to request an administrative check of the candidate's short answer card to verify that the card reader scanned the card correctly and that the output file reflected this data. This request must be made within three weeks after the release of grades.

Constructed Response Test Items

Once candidates have received the analyses of their exams, they may appeal their grade. Only candidates with valid appeals will be considered. Sample answers to constructed response (essay) questions will be available on July 31, 2012, for May Examinations, and January 31, 2013, for October Examinations. The sample constructed response answers are actual responses that have received credit and are illustrative of successful answers, although they may not be considered perfect answers.

If the candidate believes that the sample constructed response answer is incorrect or there is an alternative correct solution, the candidate must provide specific information on why his or her solution is correct. With specific information, the Examination Committee can research the answer properly and reply to the candidate. An example of an invalid appeal would be the following: "I am appealing my score of 5 on Exam 9, please recheck my examination." Another example of an invalid appeal would be: "On question number 2, I believe I should get full credit because I answered the following . . ."

Appeals must reach the CAS Office not later than **August 31, 2012**, for May 2012 Examinations and **March 1, 2013**, for October 2012 Examinations. Should an exam's sample answers be posted later than the date stated in the "Conduct of Exams" section above, the appeal deadline for that specific exam will be extended to 30 days after the posting date of that exam's sample answers. When a valid appeal is received, it is reviewed by the part chairperson and a recommendation is made to the Examination Committee chairperson. The Examination Committee chairperson will respond based on the recommendation of the part chairperson. The decision of the Examination Committee chairperson is final.

Confidentiality of Examination Records

The fact that a candidate has passed a particular examination is considered public knowledge. Any further information as to examinations taken by candidates and scores received by candidates is available only to the candidates themselves, to Examination Committee officials if required for committee purposes, and to the CAS Office, unless the candidate requests in writing that such information be provided to someone else. However, if any action is taken against a candidate as a result of his or her conduct (as described in the section on Examination Discipline), the Casualty Actuarial Society, at its sole discretion, may disclose such information to any other bona fide actuarial organization that has a legitimate interest in such results and/or actions. The candidate authorizes and consents to the Society using and disclosing (including, but not limited to, disclosing to the third-party contractors and service-providers of the Society) personally identifiable information about the candidate as necessary and

appropriate for the purposes of registering the candidate for the exam, conducting the exam, determining the results of the exam, and communicating with the candidate regarding the results of the exam.

Transition Programs

The CAS generally reviews and makes revisions to the study material on an annual basis. Occasionally, a major topic will be added to or deleted from the syllabus. A major topic is defined as a series of learning objectives comprising a segment of an examination. When a major topic is added, the Syllabus Committee will determine if a transition program is appropriate. A transition program is generally appropriate when candidates are in a position to lose credit for a segment of an examination.

A transition program usually will provide candidates with at least two opportunities to complete the requirements for that examination. The completion of the requirements will result in the achievement of credit for that entire examination. The failure to fulfill the requirements for that complete examination could result in the expiration of credit for that deleted topic at the end of the transition period. The CAS Board of Directors must approve any transition program.

Current Education Structure

The CAS Board of Directors approved the following transition rules for the education structure that was implemented in January 2011:

Credit in 2010	Credit in the 2011 Education Structure
Exam 5	Half of Exam 5 (section on Basic Techniques for Ratemaking)* and Online Course 1
Exam 6	Half of Exam 5 (section on Estimating Claim Liabilities)* and Exam 7 on Estimation of Policy Liabilities, Insurance Company Valuation, and Enterprise Risk Management
Exam 7	Nation-specific Exam 6 on Regulation and Financial Reporting and Online Course 2
Exam 8	Exam 9 on Financial Risk and Rate of Return
Exam 9	Exam 8 on Advanced Ratemaking

*Note: To receive credit for the new Exam 5 on Basic Techniques for Ratemaking and Estimating Claim Liabilities, the candidate must have credit for both old Exams 5 and 6. At the time of transition, if a candidate has credit for only one of the required exams (either old Exam 5 or Exam 6), the candidate will be allowed to take just the part of the exam for which he or she is missing credit (i.e., either the Basic Techniques for Ratemaking section or the Estimating Claim Liabilities section of the new exam) in order to obtain credit for the new exam. This option will be available for a transition period of two sittings after the official conversion to the new education structure (i.e., May 2011 and May 2012). If the candidate does not have credit for both halves of Exam 5 at the end of the transition period, the candidate would have to pass the full version of Exam 5 to receive credit.

Older Transition Rules Applicable to the Current Education Structure

For the current preliminary education structure, the CAS Board of Directors approved the following transition rule for the revision to Exam 3 that was implemented in January 2008:

Credit in 2007	Credit In Education Structure Implemented In 2008
Exam 3	Exams 3F and 3L

The CAS Board of Directors approved the following transition rules for the revised preliminary education structure that was implemented in January 2005:

Credit in 2004	Credit In Education Structure Implemented In 2005
Exam 1	Exam 1
Exam 2	Exam 2, VEE-Economics, VEE-Corporate Finance
Exam 3	Exam 3 [now Exams 3F and 3L]

Exam 4 Exam 4, VEE-Applied Statistical Methods

The following rules apply for candidates with **unused** credit from exams administered prior to 2000:

Pre-2000 Credit	Credit In New System Implemented In 2005
Exam 3A	VEE-Applied Statistical Methods
Exam 4A	Exam 2
Exam 4B	Exam 4
Exam 5A	VEE-Economics
Exam 5B	VEE-Corporate Finance

CAS Course on Professionalism

The CAS Course on Professionalism is designed to present candidates with real situations that contain ethical and professional issues for the actuary. Volunteer members of the CAS facilitate small group discussions of actual case studies. Although grades are not given for the course, candidates must actively participate in order to receive credit. Successful completion of this course is required before a candidate can become a member of the Casualty Actuarial Society.

Candidates are urged to register for this course as soon as they are eligible. To be eligible for the CAS Course on Professionalism, a candidate must:

- Have credit for any four actuarial exams **and** credit for any four of the following five requirements: Online Course 1/CA1, Online Course 2/CA2, VEE-Applied Statistical Methods, VEE-Corporate Finance, or VEE-Economics; or
- Have credit for any five actuarial exams in the current education structure—regardless of online courses or VEE status.

Note: The two segments of Exam 3—3F and 3L—together count as one exam only. Transitional VEE Exams do not count as actuarial exams.

Dates for the course will be posted in the “CAS Course on Professionalism” section of the CAS Web Site (<http://www.casact.org/education/index.cfm?fa=prof>). This page also has a link to the course preliminary readings that must be completed *prior* to attending the course. Each course is limited to 60 participants; early registration is recommended. Facility information and course times are provided when registration for specific courses is announced.

CAS Membership Requirements

Associateship

Candidates for Associateship in the Casualty Actuarial Society must fulfill the examination requirements by successful completion of, or credit for, Exams 1-6 and exams for Online Courses 1/CA1 and 2/CA2; have credit by Validation by Educational Experience (VEE) for the required topics of applied statistical methods, corporate finance, and economics; and successful completion of, or credit for, the CAS Course on Professionalism. Exam 6 is nation specific and passage of any one of the CAS-approved nation-specific exams fulfills the Associateship requirements.

After completing all the prescribed requirements, all prospective Associate members must submit a [formal application](#) to the Casualty Actuarial Society. The application form and list of application requirements are available on the CAS Web Site in the “Join/Renew” section. Obtaining the two letters of reference is the prospective member’s responsibility. If no member of the CAS is familiar with the prospective Associate and his or her work history, references from members of the American Academy of Actuaries, the Canadian Institute of Actuaries, the Society of Actuaries, other actuarial organizations that are part of the International Actuarial Association, or senior executives where the candidate is employed may be substituted. For further information on alternative acceptable references, please contact the CAS Office. An application for membership will not be processed without these references.

Candidates must have completed *all* educational requirements prior to submitting an application for CAS membership.

After all requirements are met and a completed application has been submitted to the CAS, each candidate is voted on by the CAS Executive Council. Upon approval of the CAS Executive Council, the candidate will be admitted as an Associate of the Casualty Actuarial Society (ACAS). Candidates approved by the Executive Council will be notified by letter from the CAS president. Members may indicate their designation as an Associate of the Casualty Actuarial Society by using the initials "A.C.A.S." after their names only after they have received official notification of acceptance as an Associate from the CAS.

Fellowship

In addition to fulfilling all the requirements of Associateship, successful completion of, or credit for, all nine examinations is required to fulfill the examination requirements for Fellowship and to be designated as a Fellow of the Casualty Actuarial Society (FCAS). Candidates who are admitted to the CAS as Fellows rather than Associates may indicate their designation as a Fellow of the Casualty Actuarial Society by using the initials "F.C.A.S." after their names only after they have received official notification of acceptance as a Fellow from the CAS. Associates who complete their Fellowship requirements may use the "F.C.A.S." designation immediately following official notification of successful completion of all the Fellowship requirements as prescribed by the Board of Directors.

CERA Requirements

Candidates for the CERA (Certified Enterprise Risk Analyst) designation must fulfill the educational requirements by successful completion of all CAS Associateship requirements, CAS Exams 7 and 9, the Enterprise Risk Management and Modeling Seminar (specifically designed for the CERA designation), and Exam ST9 of the Institute and Faculty of Actuaries (U.K.).

After completing all the prescribed requirements, all prospective CERA designees must submit a formal application to the Casualty Actuarial Society. The application form will be available on the CAS Web Site in the "Join/Renew" section. Candidates must have completed all educational requirements prior to submitting an application for the CERA designation.

After all requirements are met and a completed application has been submitted to the CAS, each candidate is voted on by the CAS Executive Council and then submitted to the international Treaty Board for the CERA Global Credential for approval. Upon approval, the candidate will be granted the CERA designation. CERA designees may indicate their designation by using the initials "CERA" after their names only after they have received official notification from the CAS.

Waivers

Actuarial Examinations

Waiver of individual examination requirements will be granted by the CAS Board of Directors in instances where an applicant has passed or received credit for examinations sponsored by another recognized actuarial organization that cover equivalent material in both subject and depth. The granting of waivers by the Board will be based on the recommendation of the vice president-admissions. The vice president-admissions' recommendation will be guided by the policy established by the CAS Education Policy Committee.

The CAS generally will not grant waiver of all or any portion of its examination requirements for work experience, contribution to actuarial literature, academic courses of study, or examinations of non-actuarial organizations. Individuals who claim competence in the areas covered by the examinations should not have difficulty demonstrating their competence by participating in the examination process.

Institute and Faculty of Actuaries (U.K.), Institute of Actuaries of Australia, and Institute of

Actuaries of India Examinations

The CAS recognizes some of the examinations sponsored by the Institute and Faculty of Actuaries (United Kingdom), Institute of Actuaries of Australia, and the Institute of Actuaries of India. Credit will be granted for examinations passed or waived in accordance with examination equivalencies between the CAS syllabus and the syllabi of each of the three aforementioned actuarial organizations. The CAS will not grant credit for examinations waived on account of academic records achieved in North American universities, nor for credit granted to candidates not qualifying directly in obtaining membership through the normal qualification/examination process. Credit will not be given to Fellows of these actuarial organizations who have attained their designation through mutual recognition rather than through the organization's standard credentialing process. Fellows by mutual recognition should pursue examination waivers based on their original credentials.

The following waiver policy has been approved by the CAS:

Subject of the Institute and Faculty of Actuaries (U.K.), Institute of Actuaries of Australia, and Institute of Actuaries of India*	Waiver Granted for CAS Exam/Educational Experience
CT1	Exam 2/FM
CT2	VEE-Corporate Finance
CT3	Exam 1/P
CT4 and CT5	Exam 3L
CT8	Exam 3F/MFE
CT6	Exam 4/C and VEE-Applied Statistical Methods
CT7	VEE-Economics

* Waivers will not be granted for Faculty/Institute exam credit earned through coursework except for those universities on the Faculty/Institute list as of May 7, 2000 and universities that subsequently have been approved by the CAS.

SOA Exam MLC

The CAS will grant a waiver of CAS Exam 3L to those who have passed SOA Exam MLC on life contingencies.

Online Courses

CPCU Designation

The CAS will grant a waiver of CAS Online Course 1, Risk Management and Insurance Operations, to those who have the Chartered Property Casualty Underwriter (CPCU) designation.

Validation by Educational Experience

Unlike other CAS admissions requirements, the Validation by Educational Experience (VEE) requirements are generally fulfilled outside an actuarial organization. Candidates requesting waiver of any VEE requirements based on actuarial exams should follow the procedure for requesting a waiver. Most candidates, however, will fulfill the VEE requirements through approved educational experiences and must submit the "Application for Validation by Educational Experience Credit." Details are provided in the VEE section of this *Syllabus*.

Waiver Request Process

For a waiver of a CAS admissions requirement that has an approved waiver policy stated above, candidates should present their request to the vice president-admissions with appropriate evidence that demonstrates the passing of (or score on) the educational equivalent for which a waiver is requested.

Requests for waivers for CAS admissions requirements for which there currently is no approved waiver policy are considered on a case-by-case basis. Candidates must present their requests to the vice president-admissions and include with their applications documented evidence that demonstrates the

asserted equivalence, as well as the appropriate educational policy material of their local actuarial organization or appropriate educational organization. If such material is not included, the vice president-admissions will request it from the candidates. The vice president-admissions will forward the request to the Education Policy Committee for a determination of whether sufficient equivalence exists to permit granting any examination waiver. The vice president-admissions will review all such requests and, when appropriate, recommend action to the CAS Board of Directors.

Please address all waiver requests to: Vice President-Admissions, Casualty Actuarial Society, 4350 N. Fairfax Drive, Suite 250, Arlington, VA 22203, U.S.A.

D. CAS Code of Professional Ethics for Candidates

The purpose of the Casualty Actuarial Society (CAS) Code of Professional Ethics for Candidates (Candidate Code) is to require actuarial candidates to adhere to the high standards of conduct, practice, and qualifications of the actuarial profession, thereby supporting the actuarial profession in fulfilling its responsibility to the public. An actuarial candidate shall comply with the Candidate Code. An actuarial candidate who commits a material violation of the provisions of the Candidate Code shall be subject to the counseling and discipline procedures of the CAS.

“Actuarial candidates” are those persons who have registered for a CAS specific exam but have yet to fulfill all of the requirements for admission into the CAS. In situations where actuarial candidates perform actuarial work, their “principal” is defined as their client or employer. “Actuarial services” are professional services provided to a principal by an individual acting in the capacity of an actuary. Such services include the rendering of advice, recommendations, findings, or opinions based upon actuarial considerations.

RULE 1: An actuarial candidate shall act honestly, with integrity and competence, to uphold the reputation of the actuarial profession.

RULE 2: An actuarial candidate shall not engage in any professional conduct involving dishonesty, fraud, deceit, or misrepresentation or commit any act that reflects adversely on the actuarial profession.

RULE 3: An actuarial candidate shall perform actuarial services with courtesy and professional respect and shall cooperate with others in the principal’s interest.

RULE 4: An actuarial candidate shall adhere to the CAS Policy on Examination Discipline.

Rule 5: Actuarial candidates are not authorized to use membership designations of the CAS until they are admitted to membership by the CAS Executive Council.

RULE 6: An actuarial candidate shall not disclose to another party any confidential information unless authorized to do so by the principal or required to do so by law, statute, or regulation. Confidential information includes information of a proprietary nature and information that is legally restricted from circulation.

RULE 7: An actuarial candidate shall respond promptly, truthfully, and fully to any request for information by, and cooperate fully with, appropriate counseling and disciplinary body of the CAS in connection with any disciplinary, counseling or other proceeding of such body relating to the Candidate Code. The actuarial candidate’s responsibility to respond shall be subject to applicable restrictions listed in Rule 6 and those imposed by law, statute, or regulation.

(The code above was approved by the CAS Board of Directors on November 12, 2006.)

A copy of the Casualty Actuarial Society Rules of Procedure for Disciplinary Actions Involving Candidates is available in the “Admissions/Exams” section of the CAS Web Site under “Codes of Professional Conduct and Ethics.”

HINTS ON STUDY AND EXAM TECHNIQUES

Editor's Note: These hints do not include any material on which candidates will be examined, but are provided by members of the CAS Syllabus and Examination Committees to encourage candidates to do their best when sitting for CAS Examinations. This section has been updated many times over the years, most recently in 2010. It is based on the experience and advice of many people. An early version was prepared by James L. Clare for the Society of Actuaries and then G.D. Morison adapted it for the Casualty Actuarial Society.

Motivation

Motivation is the single most important ingredient in learning—and in passing exams. Motivation suffers when candidates worry about or are preoccupied with personal matters or other problems. This suggests that candidates should keep the studying for the exam at the very top of their lists of priorities, and should always have a constructive attitude about their studying. In particular, candidates should approach the exam as an opportunity to enhance their knowledge and understanding of actuarial science, rather than as an obstacle in their paths to membership in the CAS.

Motivation is increased by incentives, such as the following:

- Passing actuarial exams requires many hours of study—more for some people and less for others—but often more than many candidates realize. Putting in enough hours can actually save a candidate time. Suppose, for example, that mastering the syllabus for one exam will take a candidate 400 study hours, and that a candidate only puts in 300 hours and fails the exam the first time. He or she then puts in a second 300 hours and passes the exam the second time. That candidate will have spent 600 hours, when by studying 400 hours the first time around, he or she would have saved 200 hours, not to mention passing one year sooner. It is recommended that candidates decide for themselves how many hours they really need to study, and then do that much studying—the first time around.
- Candidates can increase their motivation level by regarding the exams as a stepping stone to greater responsibility at their places of employment, to opportunities for getting more done on their own, and to greater results and rewards from their work.
- Candidates can also increase their motivation through sufficiently intensive and sustained study so that they come to appreciate more fully the fascination of the various subjects, and the interrelationships between them. A number of doctors, educators, executives, and human resources professionals agree that motivation can be greatly increased by having a goal in mind. Candidates must determine their goals and keep them in mind.

Techniques

It has been proven many times in various countries, both by individuals and by controlled groups, that improved study and exam techniques can strengthen a candidate's mastery of a subject and increase his or her exam scores significantly. Provided that the candidate is motivated and spends enough time studying, techniques such as those given here often make the difference between failing or passing an exam.

Each person has his or her own strengths and weaknesses, so candidates are advised to work out their own personal sets of techniques which will work best for them. What follows are merely suggestions to help candidates in getting started in building up their own techniques.

The Challenge

It is easy to underestimate the effort that is required because substantial changes may be needed to switch from college or university life to successful study of actuarial exams.

University courses often do much to smooth the path for students with lectures, personal contacts, organized places of study, and a focus on learning.

By contrast, actuarial candidates must work a great deal on their own to reach their goals. Much actuarial studying is normally fit in after a full day's work, or is done on a weekend when one's friends are free to do as they please. Making adequate time available for studying requires sustained self-discipline and is a purely individual and personal responsibility.

Schedule of Study

There is only one substitute for hours of study time omitted one week—at least as many additional hours of study in another week. An unavoidably “necessary condition” for success in studying (though not necessarily “sufficient condition”) is simply spending enough total hours studying.

Candidates must decide how many hours in total they need to study. Then they need to set out their schedules in writing, specifically stating the weekday evening and weekend periods allocated to studying. They then should total the number of hours made available. If the total hours scheduled are less than the total hours necessary, candidates should expand their schedules until they at least have equaled the required total time plus an additional cushion for absorbing time that will inevitably be lost along the way on account of illness, work pressures, etc.

Then candidates should fit all the segments of the syllabus into their schedules so that they will thoroughly cover all the learning objectives, knowledge statements, and readings in good time before the exam, with time left over for a thorough final review. It is important for candidates to spread their time over the entire syllabus in some deliberate way, for example, in proportion to the pages of reading material on the syllabus or to the range of weight given to the material.

It is *not* appropriate to assume that certain parts of the syllabus will not appear on the exam either because of historical precedent or because of the range of weight given to the material.

Candidates may find it helpful to study several subjects within an exam, or all of them, in parallel. This gives them more variety each week, and may give them a combination of both study that is more appealing and study that requires greater effort and concentration. Particularly demanding study may be best left for weekends when candidates are less fatigued from regular work.

It is a good idea for candidates to keep a record of the hours they spend studying. Even if candidates are completely confident that they know the syllabus before putting in their required total hours, there is much to be said for carrying out the full schedule and completing the total time quotas.

Retention

As part of human nature, our memories forget facts and ideas most rapidly during the time immediately following our study of them. For a given number of study hours, therefore, candidates will remember more if they review promptly and frequently. It is recommended that candidates review what they have learned as part of ending their study for the day.

Before reading a paper or section of text, candidates should scan the section for titles, headings, subheadings, and topic sentences to get the general idea, paying attention to graphs, charts, and diagrams. They should read the summary at the end of the paper or chapter and look for leading questions and exercises at the beginning and at the end.

After the initial skim, candidates should read through the entire material one section at a time for the main ideas, and not worry if the reading is relatively slow. Technical reading is challenging and requires more careful processing. Although it is tempting, candidates may want to avoid taking detailed notes at this time, but rather focus on understanding the material. Taking notes at this point may not be an efficient technique—candidates may take down too much information or simply copy information without understanding. If a section is difficult to understand, candidates should mark it to review in a later pass.

As each section or paper is completed, candidates should paraphrase and write down just the main ideas in their own words without looking at the source material. Putting the information in one's own words forces one to become actively involved with the material. It helps improve retention, and forces attention to those items that are not really understood and require further study. While the extent of a candidate's notes will be a matter of his or her own personal tastes, taking thorough notes will be a good investment of time for most people. Upon reviewing their notes, if candidates find gaps in their knowledge or in their understanding, they should bear down on those areas and master them.

As they begin their next study session, candidates should review what they learned the last time and what they learned during other recent sessions. Then they can recall points they have learned during odd spare moments in between study sessions.

In their study for the mathematical sections of the Associateship exams, candidates are advised to work out as many examples as possible in order to acquire facility in the application of the mathematical principles and methods to specific problems.

Candidates should note the considerable emphasis in actuarial exams on knowledge. They should remember, however, that the best way to learn facts by heart is to understand the whole subject, and to tie together ideas that are related. They should look at any single subject from several different angles, relating what they learn to what they know already. Candidates should look for as many connections as they can between their actuarial work and their actuarial studies.

Another study technique candidates might want to try is to test themselves as they go along. They can review previous exams when they start to study to get an idea of the mastery of the syllabus expected. Candidates can also take these as "trial exams" to help them in testing their knowledge and understanding of the course of reading, and in improving their exam speed and confidence.

Some candidates deliberately test themselves; others prefer not to do so. Candidates should expect a gradual gathering of momentum as they begin their study for a particular exam. By keeping at it, according to their plans, candidates will find their rate of progress speeding up after the first few weeks.

When a candidate finds himself or herself getting very "stale," one possibility is to stop studying altogether for, perhaps, three days. Then the candidate should continue on with his or her study plan, no matter how he or she feels, for at least the next month or six weeks. A candidate's study plan should have enough spare time available in it to allow for such occasional "down time." Following a mixed schedule, with a weekly combination of subjects that the candidate likes and subjects that he or she finds difficult, will help to minimize staleness.

Discussing the syllabus with friends taking the same exam, or with others who have passed the exam, will help candidates remember the material firmly and understand it. It also helps candidates to realize their own gaps and difficulties. If effective study circles, online forums, and review courses can be found, they will give candidates a different slant on the subject, give them a chance to review and to practice, keep them moving through the syllabus, and help to combat lethargy and self-satisfaction.

It is important for candidates to leave time for a thorough final review before the exam. In the last three or four weeks before the exam, candidates should use practice exams to simulate the exam experience as closely as possible, while keeping in mind that they need to be able to pass any set of exam questions which has been drawn from the syllabus.

When taking the practice exams, candidates should set up a clean, distraction-free space and allow plenty of uninterrupted time. Candidates should develop a plan for how to answer the questions. One strategy is to determine a time limit for each point and stick to it. If there are 80 points on the four-hour exam, allow about two and a half minutes for each point, leaving time for review at the end. When the time is up for one question, move on to the next question. Incomplete answers may be completed during the review time.

Candidates are responsible for mastery of the learning objectives and knowledge statements in the syllabus and the associated readings that pertain to these learning objectives and knowledge statements. Simply relying on seminar notes, past exams, or on material from review courses or online forums may leave a candidate missing salient and important knowledge necessary to obtain maximum points on the exam.

Formulating Answers

Multiple-Choice Questions

Candidates can definitely improve their speed and mastery by seriously practicing sample exam type questions before the exam. It helps to have a good understanding of the subject material. Candidates can also develop valuable shortcuts, such as eliminating impossible answers by checking out boundary conditions, by inspecting other aspects of certain suggested solutions, or by substituting numerical values and cutting out some answers. Since questions are varied, candidates will need a variety of techniques to cope with them.

In a multiple-choice exam, candidates increase their chances of passing if they are able to seriously attempt each question on the entire exam at least once. It may help them to determine the proportionate number of questions to answer in the first half-hour of the exam, to check how much ground they cover in that time, and then accordingly either speed up, or slow down and dig more deeply.

When pressed for time, it may pay for candidates to omit a few multiple-choice questions that they expect to take more time than average, so as to have time for a larger number of more quickly answered questions. For example, a cluster of questions may have a common introduction that a candidate does not readily grasp, in which case he or she might skip the entire cluster at a first attempt.

Candidates may find it helpful to keep a list of the number of the questions not answered so that they quickly can get an idea of how many they are omitting. This will allow the candidate to quickly return to these questions.

Candidates should change their answers only if they are sure that their first solution was wrong.

Constructed Response Questions

The model response to the typical constructed response (e.g., essay style) question depends on the level of knowledge that the question is asking the candidate to demonstrate.

For non-calculation questions, there are typically three levels of information that may be tested: a deep understanding of the material, an average understanding of the material, or a concise understanding of the material.

The “action” verbs of each question (e.g., explain, identify, describe, determine, etc.) are chosen very deliberately by question writers to instruct the candidates how to answer the question in order to demonstrate the required mastery of the learning objective(s) that the question is testing.

Very often, the question writer will add an adverb before the action verb, most notably the adverb “briefly.” This one simple word means a great deal to both the question writer and the grader. Just as importantly, the absence of this word means a great deal to the writer and the grader.

The verbs and adverbs used, or not used, and the point values assigned to each question and subpart provide cues to how the candidates are expected to answer each question. A typical key for any exam follows this rubric:

- “Brief” descriptions, discussions, etc., are worth $\frac{1}{4}$ point, so candidates should respond concisely, but with clarity regarding what is being communicated.
- (Unmodified) discussions or descriptions are worth $\frac{1}{2}$ point, so candidates should provide a more in-depth response with more detail compared to a question that asks for a brief response, but typically not more than one-half of a written page.
- Full descriptions or discussions are worth at least 1 point, so candidates should provide a detailed and thorough response in order to ensure that they demonstrate strong mastery of the relevant topic

For questions that require candidates to work a numerical solution, candidates should take the time to set up the problem so that they document their understanding. They should set forth relevant equations or formulae, then enter appropriate values. They should lay out complicated calculations in tables that demonstrate their understanding of the correct solution. If the candidate needs to set forth further assumptions to answer the question, these assumptions should be provided and explained. If a candidate is pressed for time, then setting up the response and walking through how it would be calculated will earn the candidate partial credit on the question despite not having punched the numbers on the calculator to get the final answer.

Candidates should keep each answer relevant to the precise question being asked. They should make sure they first understand exactly what is wanted before they begin to answer a question. When they have written part or all of their answer, they should take another look at the question and make sure they have answered—not their own question—but the question as set on the exam page.

If a candidate believes that a question is ambiguous, or that it does not provide all the information necessary to answer the question, the candidate should state how he or she interprets the question and/or what assumptions are made to answer it.

Candidates should take time to write legibly, since examiners can only give credit for what they can read. They should try to “organize” their answer. Then, their aim should be to get down sufficient relevant detail given the question’s scope and available time.

There is no advantage to answering the questions in any particular order. Candidates may answer the questions in the order given if they wish. Candidates are given a 15-minute reading period prior to the exam at which point the candidate can quickly read over the whole paper and determine their ideal test taking approach. For example, candidates may wish to start on questions that come easily to them, then gradually work into the questions they find more challenging, and end on a question that they think can be answered readily even though, by that time, their energy and concentration may be falling off.

Note that since each question is graded separately, each answer must be self-contained. Candidates should not write, “Part of my answer to question 1 is found in my answer to question 3.”

It is important that candidates remember that they have limited time. Candidates will find that it is worth checking their progress to assure that they have an opportunity to respond to every question. If they know that a question will take too much time, they can pass it and return to it later, if time permits.

Candidates should never give up in the examination room. They should use every minute and every second of the available time. They should not “grade their own papers,” and decide not to hand in an answer to a question or two because they feel it is all wrong. They should hand in all of their answers, and let the examiners do the grading. More than one candidate has not handed in some answer pages which he or she had condemned in his or her own mind, only to find out later that the work was correct, and to find out still later that he or she had narrowly failed to pass.

STUDY RESOURCES

Study Notes for Exams 1/P, 2/FM, 3F/MFE, and 4/C

Official Study Notes are published to help candidates prepare for the examinations. In some instances, Study Notes are the principal materials for study; in others, they are designed to coordinate the subject for the candidate or to complement other readings. Occasionally, the course of reading for an examination may be changed after publication of the *Syllabus*. Such a change will be announced on the specific exam syllabus Web page.

Study Notes may be downloaded at no charge from the specific exam syllabus Web page.

Study Kits and for Exams 5-9

The Study Kit contains required readings not owned by the CAS but for which the CAS has been granted permission to include in the Study Kit. Study Kits will be available December 1, 2011, for Spring 2012 exams and on April 2, 2012, for Fall 2012 exams. Study Kits may be purchased from the CAS Online Store; there are NO RETURNS and NO REFUNDS.

Online Publications for Exams 3L and 5-9

The readings listed as “Online Publications” in this *Syllabus* may be downloaded at no charge from the text references section at the end of each exam syllabus.

Online Courses 1/CA1 and 2/CA2

All required educational content for Online Courses 1/CA1 and 2/CA2 is provided in the online courses themselves.

Sample Examination Questions

Exams 1/P, 2/FM, 3F/MFE, and 4/C

Sample examination questions for Exams 1/P, 2/FM, 3F/MFE, and 4/C are available at no charge on the specific exam syllabus Web page.

Exams 3L and 5-9

Copies of recent past exams for Exams 3L and 5-9 with sample answers are available at no charge in the “Study Tools” section of the CAS Web Site. Sample essay answers are actual responses that received credit and are illustrative of successful answers, although they may not be considered perfect answers.

Exams 3L and 5-9 will be posted in the “Admissions/Exams” section of the CAS Web Site approximately one week after these examinations have been administered. They will include a *preliminary* list of multiple-choice answers. Sample essay answers and final multiple-choice answers will be posted at the end of July for May Examinations and at the end of January for October Examinations.

In referring to a published prior examination, candidates should keep in mind that the questions were based on the learning objectives in effect for that particular examination and may not reflect the current learning objectives. Candidates may also expect future examinations to vary somewhat as to the proportions of question styles and subjects. New forms of questions may appear from time to time, and the total number of questions may vary from one exam sitting to the next.

E-Mail Study Groups

The CAS has available e-mail study groups for those preparing for CAS examinations. Information about joining a study group is available in the “E-Mail Study Groups” section of the CAS Web Site. Please direct any questions to the CAS webmaster at webmaster@casact.org.

CAS Library

The CAS Library has available for loan a limited number of the books marked with a bold **L** in this *Syllabus*. Candidates registered for CAS Examinations and all members of the CAS have access to the library. The CAS Library is located at the CAS Office in Arlington, Virginia. For those who reside in East Asia, the Actuaries Office in Hong Kong has CAS Library books available for lending and candidates residing in that area should contact the office in Hong Kong.

Books and manuals may be withdrawn from the library for a period of one month without charge. In general, not more than two references may be in the hands of one borrower at a time. Requests must be in writing and must include the borrower’s complete name, address, and telephone number as well as the complete title(s) and author(s) of the requested book(s). Address requests for library books to:

For Candidates Outside East Asia:

Casualty Actuarial Society
Attention: Library Service
4350 N. Fairfax Drive, Suite 250
Arlington, Virginia 22203
Fax: (703) 276-3108
E-mail: library@casact.org

For candidates in East Asia:

Actuaries Office in Hong Kong
Attention: Patricia Kum
2202 Tower Two, Lippo Centre
89 Queensway
Hong Kong
E-mail: hongkonglibrary@casact.org

Candidates are responsible for the cost of returning library books. Books must be returned to the office from which they were borrowed. The CAS ships the requested book(s) in the U.S. via United Parcel Service (UPS) and internationally via Air Mail. Due to delays in the mail system, the CAS requires all shipments of books returned to the CAS Office to be shipped via UPS, FedEx, or an equivalent carrier with tracking capabilities. Please do not use the postal service. Overdue books will be charged at a cost of 25¢ per day.

Books that are not available through the CAS Library may be obtained by contacting the organizations listed in the “Publishers and Distributors” section at the end of each examination syllabus section.

2012 EXAMINATION SCHEDULE

Exam 1/P by Computer-Based Testing

	EXAM DATES	DURATION	START TIME	REGISTRATION DEADLINE
January Test Window	January 19-30, 2012	3 Hours	Various	December 8, 2011
- Limited paper/pencil sites	January 19, 2012	3 Hours	8:30 a.m.	December 8, 2011
March Test Window	March 15-26, 2012	3 Hours	Various	February 2, 2012
May Test Window	May 10-21, 2012	3 Hours	Various	March 29, 2012
- Limited paper/pencil sites	May 15, 2012	3 Hours	8:30 a.m.	March 29, 2012
July Test Window	July 19-30, 2012	3 Hours	Various	June 7, 2012
September Test Window	September 13-24, 2012	3 Hours	Various	August 2, 2012
- Limited paper/pencil sites	September 13, 2012	3 Hours	8:30 a.m.	August 2, 2012
November Test Window	November 8-19, 2012	3 Hours	Various	September 25, 2012

Note: Exam 1/P is administered by paper-and-pencil exam in limited sites outside the U.S. where CBT is not available on the dates indicated above.

Exam 2/FM by Computer-Based Testing

	EXAM DATES	DURATION	START TIME	REGISTRATION DEADLINE
February Test Window	February 8-18, 2012	3 Hours	Various	December 21, 2011
- Limited paper/pencil sites	February 8, 2012	3 Hours	8:30 a.m.	December 21, 2011
April Test Window	April 9-18, 2012	3 Hours	Various	February 27, 2012
June Test Window	June 4-14, 2012	3 Hours	Various	April 23, 2012
- Limited paper/pencil sites	June 4, 2012	3 Hours	8:30 a.m.	April 23, 2012
August Test Window	August 8-18, 2012	3 Hours	Various	June 27, 2012
October Test Window	October 8-18, 2012	3 Hours	Various	August 27, 2012
- Limited paper/pencil sites	October 8, 2012	3 Hours	8:30 a.m.	August 27, 2012
December Test Window	December 3-13, 2012	3 Hours	Various	October 22, 2012

Note: Exam 2/FM is administered by paper-and-pencil exam in limited sites outside the U.S. where CBT is not available on the dates indicated above.

Exam 3F/MFE by Computer-Based Testing

	EXAM DATES	DURATION	START TIME	REGISTRATION DEADLINE
April Test Window	April 19-25, 2012	3 Hours	Various	March 8, 2012
- Limited paper/pencil sites	April 19, 2012	3 Hours	8:30 a.m.	March 8, 2012
August Test Window	August 1-7, 2012	3 Hours	Various	June 20, 2012
- Limited paper/pencil sites	August 1, 2012	3 Hours	8:30 a.m.	June 20, 2012
November Test Window	November 1-7, 2012	3 Hours	Various	September 25, 2012
- Limited paper/pencil sites	November 7, 2012	3 Hours	8:30 a.m.	September 25, 2012

Note: Exam 3F/MFE is administered by paper-and-pencil exam in limited sites outside the U.S. where CBT is not available on the dates indicated above.

Exam 4/C by Computer-Based Testing

	EXAM DATES	DURATION	START TIME	REGISTRATION DEADLINE
February Test Window	February 1-7, 2012	3.5 Hours	Various	December 21, 2011
- Limited paper/pencil sites	February 1, 2012	3.5 Hours	8:30 a.m.	December 21, 2011
May Test Window	May 22-29, 2012	3.5 Hours	Various	April 10, 2012
- Limited paper/pencil sites	May 22, 2012	3.5 Hours	8:30 a.m.	April 10, 2012
October Test Window	October 19-25, 2012	3.5 Hours	Various	September 10, 2012
- Limited paper/pencil sites	October 19, 2012	3.5 Hours	8:30 a.m.	September 10, 2012

Note: Exam 4/C is administered by paper-and-pencil exam in limited sites outside the U.S. where CBT is not available on the dates indicated above.

Computer-Based Testing in Québec City, Québec

A mobile computer-based testing center will be available in Québec City, Québec on the dates listed below.				
	EXAM DATES	DURATION	START TIME	REGISTRATION DEADLINE
April Test Window				
- Exam 2/FM	April 18-19, 2012	3 Hours	Various	February 27, 2012
- Exam 3F/MFE	April 18-19, 2012	3 Hours	Various	March 8, 2012
May Test Window				
- Exam 1/P	May 21-22, 2012	3 Hours	Various	March 29, 2012
- Exam 4/C	May 21-22, 2012	3.5 Hours	Various	April 10, 2012
October Test Window				
- Exam 2/FM	October 18-19, 2012	3 Hours	Various	August 27, 2012
- Exam 4/C	October 18-19, 2012	3.5 Hours	Various	September 10, 2012
November Test Window (Computer-Based Testing in Québec City, Québec)				
- Exam 1/P	November 7-8, 2012	3 Hours	Various	September 25, 2012
- Exam 3F/MFE	November 7-8, 2012	3 Hours	Various	September 25, 2012

Exams for Online Courses 1 and 2 by Computer-Based Testing

	EXAM DATES	DURATION	START TIME	EXAM REFUND DEADLINE
January-March Test Window	Jan. 15 – March 15, 2012	2 Hours	Various	Three business days prior to scheduled exam—fees apply.
April-June Test Window	April 15 – June 15, 2012	2 Hours	Various	Three business days prior to scheduled exam—fees apply.
July-September Test Window	July 15 – Sept. 15, 2012	2 Hours	Various	Three business days prior to scheduled exam—fees apply.
October-December Test Window	Oct. 15 – Dec. 15, 2012	2 Hours	Various	Three business days prior to scheduled exam—fees apply.

May 2012 Exam Administration

EXAM	EXAM DATE	DURATION	START TIME	REGISTRATION DEADLINE	REFUND DEADLINE
Exam 3L	May 11, 2012	2.5 Hours	8:30 a.m.	March 29, 2012	May 7, 2012
Exam 5	May 9, 2012	4 Hours	8:30 a.m.	March 29, 2012	May 7, 2012
Transition Exams 5A and 5B*	May 9, 2012	2 Hours	8:30 a.m.	March 29, 2012	May 7, 2012
Exam 7	May 8, 2012	4 Hours	8:30 a.m.	March 29, 2012	May 7, 2012
Exam 9	May 10, 2012	4 Hours	8:30 a.m.	March 29, 2012	May 7, 2012

*For eligible candidates only

October-November 2012 Exam Administration

EXAM	EXAM DATE	DURATION	START TIME	REGISTRATION DEADLINE	REFUND DEADLINE
Exam 3L	November 1, 2012	2.5 Hours	8:30 a.m.	September 20, 2012	October 29, 2012
Exams 6-Canada and 6-U.S.	October 31, 2012	4 Hours	8:30 a.m.	September 20, 2012	October 29, 2012
Exam 8	October 30, 2012	4 Hours	8:30 a.m.	September 20, 2012	October 29, 2012

Important Schedule Notes

- Starting times listed for examinations refer to the local time.
- Candidates should arrive at the examination center at least 30 minutes prior to the scheduled exam time for the check-in process.
- Examinations administered exclusively by the CAS will have a reading time prior to the commencement of the timed exams. For Exam 3L, there will be a 10-minute reading period; for Exams 5-9, there will be a 15-minute reading period.
- Updated information for Exams 1/P, 2/FM, 3F/MFE, and 4/C that are jointly administered by the Casualty Actuarial Society and the Society of Actuaries will be incorporated as necessary and will be noted in the syllabus section for the specific exam.

2013 EXAMINATION SCHEDULE

Exam 1/P by Computer-Based Testing

	EXAM DATES	DURATION	START TIME	REGISTRATION DEADLINE
January Test Window	Jan. 10-21, 2013	3 Hours	Various	Dec. 3, 2012
- Limited paper/pencil sites	Jan, 10, 2013	3 Hours	8:30 a.m.	Dec. 3, 2012
March Test Window	March 14-25, 2013	3 Hours	Various	Jan. 31, 2013
May Test Window	May 13-24, 2013	3 Hours	Various	Apr. 2, 2013
- Limited paper/pencil sites	May 13, 2013	3 Hours	8:30 a.m.	Apr. 2, 2013
July Test Window	July 18-29, 2013	3 Hours	Various	June 6, 2013
September Test Window	Sept. 19-30, 2013	3 Hours	Various	Aug. 8, 2013
- Limited paper/pencil sites	Sept. 19, 2013	3 Hours	8:30 a.m.	Aug. 8, 2013
November Test Window	Nov. 1-12, 2013	3 Hours	Various	Sept. 26, 2013

Note: Exam 1/P is administered by paper-and-pencil exam in limited sites outside the U.S. where CBT is not available on the dates indicated above.

Exam 2/FM by Computer-Based Testing

	EXAM DATES	DURATION	START TIME	REGISTRATION DEADLINE
February Test Window	Feb. 8-19, 2013	3 Hours	Various	Dec. 27, 2012
- Limited paper/pencil sites	Feb. 8, 2013	3 Hours	8:30 a.m.	Dec. 27, 2012
April Test Window	April 9-20, 2013	3 Hours	Various	Feb. 26, 2013
June Test Window	June 6-17, 2013	3 Hours	Various	April 25, 2013
- Limited paper/pencil sites	June 6, 2013	3 Hours	8:30 a.m.	April 25, 2013
August Test Window	Aug. 8-19, 2013	3 Hours	Various	June 27, 2013
October Test Window	Oct. 8-19, 2013	3 Hours	Various	Aug. 27, 2013
- Limited paper/pencil sites	Oct. 8, 2013	3 Hours	8:30 a.m.	Aug. 27, 2013
December Test Window	Dec. 9-20, 2013	3 Hours	Various	Oct. 28, 2013

Note: Exam 2/FM is administered by paper-and-pencil exam in limited sites outside the U.S. where CBT is not available on the dates indicated above.

Exam 3F/MFE by Computer-Based Testing

	EXAM DATES	DURATION	START TIME	REGISTRATION DEADLINE
March Test Window	Mar. 7-13, 2013	3 Hours	Various	Jan. 24, 2013
- Limited paper/pencil sites	Mar. 7, 2013	3 Hours	8:30 a.m.	Jan. 24, 2013
July Test Window	July 11-17, 2013	3 Hours	Various	May 30, 2013
- Limited paper/pencil sites	July 11, 2013	3 Hours	8:30 a.m.	May 30, 2013
November Test Window	Nov. 13-19, 2013	3 Hours	Various	Oct. 2, 2013
- Limited paper/pencil sites	Nov. 13, 2013	3 Hours	8:30 a.m.	Oct. 2, 2013

Note: Exam 3F/MFE is administered by paper-and-pencil exam in limited sites outside the U.S. where CBT is not available on the dates indicated above.

Exam 4/C by Computer-Based Testing

	EXAM DATES	DURATION	START TIME	REGISTRATION DEADLINE
February Test Window	Feb. 1-7, 2013	3.5 Hours	Various	Dec. 20, 2012
- Limited paper/pencil sites	Feb. 1, 2013	3.5 Hours	8:30 a.m.	Dec. 20, 2012
June Test Window	June 18-24, 2013	3.5 Hours	Various	May 7, 2013
- Limited paper/pencil sites	June 18, 2013	3.5 Hours	8:30 a.m.	May 7, 2013
October Test Window	Oct. 1-7, 2013	3.5 Hours	Various	Aug. 20, 2013
- Limited paper/pencil sites	Oct. 1, 2013	3.5 Hours	8:30 a.m.	Aug. 20, 2013

Note: Exam 4/C is administered by paper-and-pencil exam in limited sites outside the U.S. where CBT is not available on the dates indicated above.

Computer-Based Testing in Québec City, Québec

A mobile computer-based testing center will be available in Québec City, Québec on the dates listed below.				
	EXAM DATES	DURATION	START TIME	REGISTRATION DEADLINE
March Test Window				
- Exam P/1	Mar. 13-14, 2013	3 Hours	Various	Jan. 31, 2013
- Exam 3F/MFE	Mar. 13-14, 2013	3 Hours	Various	Jan. 24, 2013
June Test Window				
- Exam FM/2	June 17-18, 2013	3 Hours	Various	Apr. 25, 2013
- Exam 4/C	June 17-18, 2013	3.5 Hours	Various	May 7, 2013
October Test Window				
- Exam 2/FM	Oct. 7-8, 2013	3 Hours	Various	Aug. 27, 2013
- Exam 4/C	Oct. 7-8, 2013	3.5 Hours	Various	Aug. 20, 2013
November Test Window (Computer-Based Testing in Québec City, Québec)				
- Exam 1/P	Nov. 12-13, 2013	3 Hours	Various	Sept. 26, 2013
- Exam 3F/MFE	Nov. 12-13, 2013	3 Hours	Various	Oct. 2, 2013

Exams for Online Courses 1 and 2 by Computer-Based Testing

	EXAM DATES	DURATION	START TIME	EXAM REFUND DEADLINE
January-March Test Window	Jan. 15 – March 15, 2013	2 Hours	Various	Three business days prior to scheduled exam—fees apply.
April-June Test Window	April 15 – June 15, 2013	2 Hours	Various	Three business days prior to scheduled exam—fees apply.
July-September Test Window	July 15 – Sept. 15, 2013	2 Hours	Various	Three business days prior to scheduled exam—fees apply.
October-December Test Window	Oct. 15 – Dec. 15, 2013	2 Hours	Various	Three business days prior to scheduled exam—fees apply.

April-May 2013 Exam Administration

EXAM	EXAM DATE	DURATION	START TIME	REGISTRATION DEADLINE	REFUND DEADLINE
Exam 3L	May 3, 2013	2.5 Hours	8:30 a.m.	March 21, 2013	April 26, 2013
Exam 5	April 30, 2013	4 Hours	8:30 a.m.	March 21, 2013	April 26, 2013
Exam 7	April 29, 2013	4 Hours	8:30 a.m.	March 21, 2013	April 26, 2013
Exam 9	May 2, 2013	4 Hours	8:30 a.m.	March 21, 2013	April 26, 2013

October 2013 Exam Administration

EXAM	EXAM DATE	DURATION	START TIME	REGISTRATION DEADLINE	REFUND DEADLINE
Exam 3L	October 31, 2013	2.5 Hours	8:30 a.m.	September 19, 2013	October 25, 2013
Exam 5	October 29, 2013	4 Hours	8:30 a.m.	September 19, 2013	October 25, 2013
Exams 6-Canada and 6-U.S.	October 28, 2013	4 Hours	8:30 a.m.	September 19, 2013	October 25, 2013
Exam 8	October 30, 2013	4 Hours	8:30 a.m.	September 19, 2013	October 25, 2013

ST9 Exam Administration for CERA Designation

	EXAM DATE	DURATION	START TIME	REGISTRATION DEADLINE	REFUND DEADLINE
April Administration	April 23, 2013	3 Hours	9:30 a.m.	February 7, 2013	February 6, 2013
October Administration	October 1, 2013	3 Hours	9:30 a.m.	July 18, 2013	July 17, 2013

Important Schedule Notes

- Starting times listed for examinations refer to the local time.
- Candidates should arrive at the examination center at least 30 minutes prior to the scheduled exam time for the check-in process.
- Examinations administered exclusively by the CAS will have a reading time prior to the commencement of the timed exams. For Exam 3L, there will be a 10-minute reading period; for Exams 5-9, there will be a 15-minute reading period.
- Updated information for Exams 1/P, 2/FM, 3F/MFE, and 4/C that are jointly administered in 2013 by the Casualty Actuarial Society and the Society of Actuaries will be incorporated as necessary and will be noted in the syllabus section for the specific exam.
- To meet the CAS requirements for CERA, candidates should submit their registration to the CAS for Institute and Faculty of Actuaries (U.K.) Exam ST9.

VALIDATION BY EDUCATIONAL EXPERIENCE

Introduction

As part of preliminary education, there are three topics that require Validation by Educational Experience (VEE). Validation of these topics is required in addition to the four preliminary education exams listed below. The CAS, in conjunction with the Canadian Institute of Actuaries and the Society of Actuaries, has implemented VEE requirements for the following topics:

- VEE-Applied Statistical Methods
- VEE-Corporate Finance
- VEE-Economics

The four preliminary education exams are:

- Exam 1, Probability (same as SOA Exam P)
- Exam 2, Financial Mathematics (same as SOA Exam FM)
- Exam 3, Actuarial Models consisting of Exam 3F, Financial Economics segment (same as SOA Exam MFE) and Exam 3L, Life Contingencies and Statistics segment (or credit for SOA Exam MLC)
- Exam 4, Construction and Evaluation of Actuarial Models (same as SOA Exam C)

In addition to the preliminary education requirements listed above (i.e., VEE requirements and four full exams), Exams 5 and 6, Online Courses 1 and 2, and the CAS Course on Professionalism are required for Associateship. The syllabi for the examinations are provided in the “Materials for Study” section of this *Syllabus*. Details about the process for obtaining credit for the VEE topics are provided below. VEE topics are not prerequisites for the preliminary examinations and may be fulfilled independently of the preliminary exam process.

VEE Process—How to Get VEE Credit

Validation by Educational Experience can be accomplished in any of the following ways:

1. **College Course(s)**
Complete one or more courses offered by a college or university and approved by the CAS, CIA, and SOA. Candidates must receive a grade of B- or better in each course. If the institution does not use letter grading, an appropriate translation will be determined. A directory of approved courses is available from the “VEE Information” section of the CAS Web Site.
2. **Standardized Examinations and Other Educational Experiences**
Achieve a pre-set score on a standardized examination or other educational experience as approved by the CAS, CIA, and SOA. A list of approved standardized exams and other educational experiences is available from the “VEE Information” section of the CAS Web Site.

Step 1: Approval of Courses/Experiences

The VEE Administration Committee (VEEAC) will determine which college courses, standardized exams, and other educational experiences are appropriate for VEE credit. Before a candidate may submit an application to receive individual credit for a VEE topic, the course or educational experience itself must first be approved and listed on either the “Directory of Approved Courses” or the “Standardized Exams and Other Educational Experiences” list. Each list identifies the educational institution, the approved courses/experiences by VEE topic, a unique approval code for each course/experience, and the years for which the courses/experiences are approved.

If a VEE Course/Experience does not appear on either list, approval must be requested by completing an official VEE course/experience approval application form and submitting it along with the required

documentation. The application form is available in the “Exam Applications and Order Forms” section. The VEEAC will review the course/experience.

The guidelines that the VEEAC will use to determine whether specific courses or educational experiences are appropriate to fulfill the VEE requirements are provided in the next three sections of this *Syllabus*.

Step 2: Approval of Individual VEE Credits for Candidates

Candidates who have credit for at least two actuarial examinations may submit an application for their own VEE credits. In addition to the application, candidates will be required to arrange for an official transcript to be submitted to the VEE administrator. The “Application for Validation by Educational Experience Credit” includes specific directions. Only courses/experiences that are listed in the online “Directory of Approved VEE Courses/Experiences” or the “Standardized Exams and Other Educational Experiences” list may be used for VEE credit. If a course/experience is not on the approved list, the candidate may submit the course for approval according to the procedures described in Step 1 above.

Candidates may combine two approved courses/experiences to complete a VEE topic requirement. For example, an approved microeconomics course from a university may be combined with an approved macroeconomics course from another school or provider. Likewise, an approved regression course may be combined with an approved time series course from two different providers. In these cases candidates should include approval codes from both approved courses on their individual VEE credit application form. **Corporate finance courses, however, must be completed in the combinations shown in the directory. No alternate combinations will be accepted without an additional course approval application process.**

Note: Candidates may not submit VEE credit applications for partial credit (e.g., an approved regression course may not be submitted alone, but must be accompanied on the same application by an approved time series course). Candidates may not submit for VEE credit for a topic until they have completed all requirements for that topic. Specific questions may be sent to vee@soa.org.

Once a candidate’s application and documentation of the required grade on an approved course/experience have been validated, credit for the specific VEE topic will be granted. The candidate will be sent a written response to each application.

VEE–Applied Statistical Methods

The following guidelines for the Validation by Educational Experience (VEE) requirement for Applied Statistical Methods will be used by the VEE Administration Committee to determine whether specific courses or educational experiences are appropriate to fulfill the VEE requirements. Details about submitting a course for approval as well as obtaining individual VEE credit are provided at the beginning of this section on VEE. The “Directory of Approved VEE Courses/Experiences” and the “Standardized Exams and Other Educational Experiences” are available in the “VEE Information” section of the CAS Web Site.

Courses that meet this requirement may be taught in the mathematics, statistics, or economics department, or in the business school. In economics departments, this course may be called Econometrics. The material could be covered in one course or two. The mathematical sophistication of these courses will vary widely and all levels are intended to be acceptable. Some analysis of real data should be included. Most of the topics listed below should be covered:

Regression analysis

1. Least square estimates of parameters
2. Single linear regression
3. Multiple linear regression
4. Hypothesis testing and confidence intervals in linear regression models
5. Testing of models, data analysis, and appropriateness of models

Time series/forecasting

1. Linear time series models
2. Moving average, autoregressive, and/or ARIMA models
3. Estimation, data analysis, and forecasting with time series models
4. Forecast errors and confidence intervals

VEE–Corporate Finance

The following guidelines for the Validation by Educational Experience (VEE) requirement for Corporate Finance will be used by the VEE Administration Committee to determine whether specific courses or educational experiences are appropriate to fulfill the VEE requirements. Details about submitting a course for approval as well as obtaining individual VEE credit are provided at the beginning of this section on VEE. The “Directory of Approved VEE Courses/Experiences” and the “Standardized Exams and Other Educational Experiences” are available in the “VEE Information” section of the CAS Web Site.

The typical corporate finance program covers the topics below in two semesters with an introductory course followed by a more advanced semester. If the second course covers most of the topics, then only the second course will be required. Where the topics are split across two semesters or courses, both will be required. The exceptional case where the corporate finance topics are covered in only one course, with no finance prerequisite, will also be considered, however, this will typically be at a more advanced level than a course designed for general business students.

Most of the topics listed below should be covered:

1. Definitions of key finance terms: stock company; capital structure
2. Key finance concepts: financing companies; characteristics and uses of financial instruments; sources of capital; cost of capital; dividend policy; personal and corporate taxation
3. Factors to be considered by a company when deciding on its capital structure and dividend policy
4. Impact of financial leverage and long/short term financing policies on capital structure
5. Characteristics of the principal forms of financial instruments issued or used by companies, and the ways in which they may be issued
6. How a company's cost of capital relates to the investment projects the company wishes to undertake
7. Definitions of key finance terms: financial instruments – bond, stock, basic options (calls, puts); dividends; price to earnings ratio
8. Structure of a stock company and the different methods by which it may be financed
9. Calculate value of stocks
10. Measures of financial performance: balance sheet; income statement; statement of cash flows; financial ratios (e.g., leverage, liquidity, profitability, market value ratios); net present value; the payback, discounted payback models; internal rate of return and profitability index models
11. Assessment of financial performance using various measures: balance sheet; income statement; statement of cash flows, financial ratios (e.g., leverage, liquidity, profitability, market value ratios); net present value; the payback, discounted payback models; internal rate of return and profitability index models

VEE–Economics

The following guidelines for the Validation by Educational Experience (VEE) requirement for Economics will be used by the VEE Administration Committee to determine whether specific courses or educational experiences are appropriate to fulfill the VEE requirements. Details about submitting a course for approval as well as obtaining individual VEE credit are provided at the beginning of this section on VEE. The “Directory of Approved VEE Courses/Experiences” and the “Standardized Exams and Other Educational Experiences” are available in the “VEE Information” section of the CAS Web Site.

Typically, the VEE requirement for Economics will be met if a candidate has completed two economics courses, one course covering microeconomics and the other covering macroeconomics. Most of the topics listed below should be covered:

Microeconomics

1. Interaction between supply and demand in the provision of a product and the way in which equilibrium market prices are determined
2. Elasticity of demand and supply and the effects on a market of different levels of elasticity
3. How rational utility maximizing agents make consumption choices
4. How profit-maximizing firms make short-run and long-run production choices
5. Different types of competition, or lack of it, and the practical effect on supply and demand

Macroeconomics

1. Structure of public sector finances of an industrialized economy
2. GDP, GNP, and Net National Product. How these concepts are used in describing the economy and in making comparisons between countries, and the limitations of these concepts
3. Propensity to save or to consume by the private sector or the corporate sector and how it affects the economy
4. Impact of fiscal and monetary policy and other forms of government intervention on different aspects of the economy, and in particular on financial markets
5. Role of exchange rates and international trade in the economy and the meaning of the term balance of payments
6. Major factors affecting the rate of inflation, the level of interest rates, the exchange rate, the level of unemployment, and the rate of economic growth in the economy of an industrialized country

Probability Exam

The Probability Exam is called Exam P by the SOA and Exam 1 by the CAS. This three-hour exam consists of 30 multiple-choice questions. The examination is jointly sponsored and administered by the SOA, CAS, and the Canadian Institute of Actuaries (CIA). The examination is also jointly sponsored by the American Academy of Actuaries (AAA) and the Conference of Consulting Actuaries (CCA).

The Probability Exam is administered as a computer-based test. For additional details, Please refer to [Exam Rules](#).

The purpose of the syllabus for this examination is to develop knowledge of the fundamental probability tools for quantitatively assessing risk. The application of these tools to problems encountered in actuarial science is emphasized. A thorough command of the supporting calculus is assumed. Additionally, a very basic knowledge of insurance and risk management is assumed.

A table of values for the normal distribution is available below for candidates to download and will be included with the examination. Since the table will be included with the examination, candidates will not be allowed to bring copies of the table into the examination room.

Check the [Updates](#) section on this exam's home page for any changes to the exam or syllabus.

The ranges of weights shown are intended to apply to the large majority of exams administered. On occasion, the weights of topics on an individual exam may fall outside the published range. Candidates should also recognize that some questions may cover multiple learning outcomes.

Each multiple-choice problem includes five answer choices identified by the letters A, B, C, D, and E, only one of which is correct. Candidates must indicate responses to each question on the computer.

As part of the computer-based testing process, a few pilot questions will be randomly placed in the exam (paper and pencil and computer-based forms). These pilot questions are included to judge their effectiveness for future exams, but they will not be used in the scoring of this exam. All other questions will be considered in the scoring. All unanswered questions are scored incorrect. Therefore, candidates should answer every question on the exam. There is no set requirement for the distribution of correct answers for the SOA/CAS/CIA multiple-choice preliminary examinations. It is possible that a particular answer choice could appear many times on an examination or not at all. Candidates are advised to answer each question to the best of their ability, independently from how they have answered other questions on the examination.

Since the CBT exam will be offered over a period of a few days, each candidate will receive a test form composed of questions selected from a pool of questions. Statistical scaling methods are used to ensure within reasonable and practical limits that, during the same testing period of a few days, all forms of the

test are comparable in content and passing criteria. The methodology that has been adopted is used by many credentialing programs that give multiple forms of an exam.

LEARNING OUTCOMES

Candidates should be able to use and apply the following concepts in a risk management context:

1. General Probability (15-30%)
 - Set functions including set notation and basic elements of probability
 - Mutually exclusive events
 - Addition and multiplication rules
 - Independence of events
 - Combinatorial probability
 - Conditional probability
 - Bayes Theorem / Law of total probability
2. Univariate probability distributions (including binomial, negative binomial, geometric, hypergeometric, Poisson, uniform, exponential, gamma, and normal) (30-50%)
 - Probability functions and probability density functions
 - Cumulative distribution functions
 - Mode, median, percentiles, and moments
 - Variance and measures of dispersion
 - Moment generating functions
 - Transformations
3. Multivariate probability distributions (including the bivariate normal) (30-45%)
 - Joint probability functions and joint probability density functions
 - Joint cumulative distribution functions
 - Central Limit Theorem
 - Conditional and marginal probability distributions
 - Moments for joint, conditional, and marginal probability distributions
 - Joint moment generating functions
 - Variance and measures of dispersion for conditional and marginal probability distributions
 - Covariance and correlation coefficients
 - Transformations and order statistics
 - Probabilities and moments for linear combinations of independent random variables

REFERENCES

Suggested Texts

There is no single required text for this exam. The texts listed below may be considered as representative of the many texts available to cover material on which the candidate may be examined. Texts are added and deleted as part of a regular process to keep the list up-to-date. The addition or deletion of a textbook does not change the bank of questions available for examinations. There is no advantage to selecting a text recently added or not using a text recently removed.

Not all the topics may be covered adequately by just one text. Candidates may wish to use more than one of the following or other texts of their choosing in their preparation. Earlier or later editions may also be adequate for review.

- A First Course in Probability (Eighth Edition), 2009, by Ross, S.M., Chapters 1–8.
- Mathematical Statistics with Applications (Seventh Edition), 2008, by Wackerly, D., Mendenhall III, W., Scheaffer, R., Chapters 1-7.
- Probability for Risk Management, (Second Edition), 2006, by Hassett, M. and Stewart, D., Chapters 1–11.
- Probability and Statistical Inference (Eighth Edition), 2009, by Hogg, R.V. and Tanis, E.A., Chapters 1–5.
- Probability and Statistics with Applications: A Problem Solving Text, 2010, by Asimow, L. and Maxwell, M.
- Probability: The Science of Uncertainty with Applications to Investments, Insurance and Engineering 2009, by Bean, M.A., Chapters 1–9.

Other Resources

The candidate is expected to be familiar with the concepts introduced in “Risk and Insurance”.

[Tables for Exam P/1](#)

Exam P/1 Sample [Questions](#) and [Solutions](#) (1–153)

[Risk and Insurance](#)

Financial Mathematics Exam—December 2012

The Financial Mathematics exam is called Exam FM by the SOA and Exam 2 by the CAS. This three-hour exam consists of 35 multiple-choice questions. The examination is administered by Preliminary Actuarial Examinations/SOA. The examination is jointly sponsored and administered by the CAS, SOA, and the Canadian Institute of Actuaries (CIA). The examination is also jointly sponsored by the American Academy of Actuaries (AAA) and the Conference of Consulting Actuaries (CCA).

The Financial Mathematics Exam is administered as a computer-based test. For additional details, please refer to [Exam Rules](#)

The goal of the syllabus for this examination is to provide an understanding of the fundamental concepts of financial mathematics, and how those concepts are applied in calculating present and accumulated values for various streams of cash flows as a basis for future use in: reserving, valuation, pricing, asset/liability management, investment income, capital budgeting, and valuing contingent cash flows. The candidate will also be given an introduction to financial instruments, including derivatives, and the concept of no-arbitrage as it relates to financial mathematics.

The Financial Mathematics Exam assumes a basic knowledge of calculus and an introductory knowledge of probability.

The following learning objectives are presented with the understanding that candidates are allowed to use specified calculators on the exam. The education and examination of candidates reflects that fact. In particular, such calculators eliminate the need for candidates to learn and be examined on certain mathematical methods of approximation.

Please check the [Updates](#) section on this exam's home page for any changes to the exam or syllabus.

The ranges of weights shown are intended to apply to the large majority of exams administered. On occasion, the weights of topics on an individual exam may fall outside the published range. Candidates should also recognize that some questions may cover multiple learning objectives.

Each multiple-choice problem includes five answer choices identified by the letters A, B, C, D, and E, only one of which is correct. Candidates must indicate responses to each question on the computer. Candidates will be given three hours to complete the exam.

As part of the computer-based testing process, a few pilot questions will be randomly placed in the exam (paper and pencil and computer-based forms). These pilot questions are included to judge their effectiveness for future exams, but they will NOT be used in the scoring of this exam. All other questions will be considered in the scoring. All unanswered questions are scored incorrect. Therefore, candidates should answer every question on the exam. There is no set requirement for the distribution of correct answers for the SOA/CAS/CIA multiple-choice preliminary examinations. It is possible that a particular answer choice could appear many times on an examination or not at all. Candidates are advised to answer each question to the best of their ability, independently from how they have answered other questions on the examination.

Since the CBT exam will be offered over a period of a few days, each candidate will receive a test form composed of questions selected from a pool of questions. Statistical scaling methods are used to ensure within reasonable and practical limits that, during the same testing period of a few days, all forms of the test are comparable in content and passing criteria. The methodology that has been adopted is used by many credentialing programs that give multiple forms of an exam.

LEARNING OBJECTIVES

I. Interest Theory (65-80%)

A. Time Value of Money (5-15%)

1. The candidate will be able to define and recognize the definitions of the following terms:
 - a. Interest rate (rate of interest)
 - b. Simple interest
 - c. Compound interest
 - d. Accumulation function
 - e. Future value
 - f. Present value/net present value
 - g. Discount factor
 - h. Discount rate (rate of discount)
 - i. Convertible m-thly
 - j. Nominal rate
 - k. Effective rate
 - l. Inflation and real rate of interest
 - m. Force of interest
 - n. Equation of value
2. The candidate will be able to:
 - a. Given any two of interest rate, present value, or future value, calculate the third based on simple or compound interest.
 - b. Given any one of the effective interest rate, the nominal interest rate convertible m-thly, the effective discount rate, the nominal discount rate convertible m-thly, or the force of interest, calculate all of the other items.
 - c. Write the equation of value given a set of cash flows and an interest rate.

B. Annuities with payments that are not contingent (5-20%)

1. The candidate will be able to define and recognize the definitions of the following terms:
 - a. Annuity-immediate
 - b. Annuity-due
 - c. Perpetuity
 - d. Payable m-thly, or Payable continuously
 - e. Level payment annuity
 - f. Arithmetic increasing/decreasing payment annuity
 - g. Geometric increasing/decreasing payment annuity
 - h. Term of annuity
2. The candidate will be able to:
 - a. Given an annuity with level payments, immediate (or due), payable m-thly, (or payable continuously), and any three of present value, future value, interest rate,

payment, and term calculate the remaining two items.

- b. Given an annuity with non-level payments, immediate (or due), payable m-thly, (or payable continuously), the pattern of payment amounts, and any three of present value, future value, interest rate, payment amounts, and term of annuity calculate the remaining two items.

C. Loans (5-20%)

1. The candidate will be able to define and recognize the definitions of the following terms:
 - a. Principal
 - b. Interest
 - c. Term of loan
 - d. Outstanding balance
 - e. Final payment (drop payment, balloon payment)
 - f. Amortization
 - g. Sinking fund
2. The candidate will be able to:
 - a. Given any four of term of loan, interest rate, payment amount, payment period, principal, calculate the remaining items.
 - b. Calculate the outstanding balance at any point in time.
 - c. Calculate the amount of interest and principal repayment in a given payment.
 - d. Given the quantities, except one, in a sinking fund arrangement calculate the missing quantity.

D. Bonds (5-20%)

1. The candidate will be able to define and recognize the definitions of the following terms:
 - a. Price
 - b. Redemption value
 - c. Par Value/Face value
 - d. Coupon, Coupon rate
 - e. Term of bond
 - f. Yield rate
 - g. Callable/non-callable
 - h. Book value
 - i. Accumulation of discount/Amortization of premium
2. The candidate will be able to:
 - a. Given any four of price, redemption value, yield rate, coupon rate, and term of bond, calculate the remaining item.

E. General Cash Flows and Portfolios (5-20%)

1. The candidate will be able to define and recognize the definitions of the following terms:
 - a. Yield rate/rate of return
 - b. Dollar-weighted rate of return/Time-weighted rate of return
 - c. Current value
 - d. Duration (Macaulay, modified and effective)
 - e. Convexity
 - f. Portfolio and investment year allocation methods
 - g. Spot rate
 - h. Forward rate

- i. Yield curve
 - j. Stock price, stock dividend
2. The candidate will be able to:
 - a. Calculate the current value of a set of cash flows.
 - b. Calculate the portfolio yield rate.
 - c. Calculate the dollar-weighted and time-weighted rate of return.
 - d. Calculate the duration and convexity of a set of cash flows.
 - e. Calculate either Macaulay or modified duration given the other.
 - f. Use duration and convexity to approximate the change in present value due to a change in interest rate.
 - g. Calculate the price of a stock using the dividend discount model.

F. Immunization (5-15%)

1. The candidate will be able to define and recognize the definitions of the following terms:
 - a. Cash-flow matching;
 - b. Immunization (including full immunization);
 - c. Redington immunization.
2. The candidate will be able to:
 - a. Construct an investment portfolio to fully immunize a set of liability cash flows.
 - b. Construct an investment portfolio to match present value and duration of a set of liability cash flows.
 - c. Construct an investment portfolio to exactly match a set of liability cash flows.

II. Financial Economics (20-35%)

A. General Derivatives (0-5%)

1. The candidate will be able to define and recognize the definitions of the following terms:
 - a. Derivative, Underlying asset, Over-the-counter market
 - b. Ask price, Bid price, Bid-ask spread
 - c. Short selling, Short position, Long position
 - d. Stock index
 - e. Spot price
 - f. Net profit/payoff
 - g. Credit risk
 - h. Marking-to-market
 - i. Margin, Maintenance margin, Margin call
2. The candidate will be able to evaluate an investor's margin position based on changes in asset values.

B. Options (5-10%)

1. The candidate will be able to define and recognize the definitions of the following terms:
 - a. Call option, Put option
 - b. Expiration, Expiration date
 - c. Strike price/Exercise price
 - d. European option, American option, Bermudan option
 - e. In-the-money, At-the-money, Out-of-the-money
 - f. Covered call, Naked writing

- g. Dividends
- h. Put-call parity

2. The candidate will be able to evaluate the payoff and profit of basic derivative contracts.

C. Hedging and Investment Strategies (5-15%)

1. The candidate will be able to define and recognize the definitions of the following terms:

- a. Hedging, Arbitrage
- b. Diversifiable risk, Nondiversifiable risk
- c. Synthetic forwards
- d. Spreads (including bull, bear, box, and ratio spreads)
- e. Collars (including zero-cost collars), Paylater strategy
- f. Straddles (including strangles, written straddles and butterfly spreads)
- f. Convertible bond, Mandatorily convertible bond

2. The candidate will be able to:

- a. Explain how derivative securities can be used as tools to manage financial risk.
- b. Explain the reasons to hedge and not to hedge.
- c. Evaluate the payoff and profit of hedging strategies.

D. Forwards and Futures (0-10%)

1. The candidate will be able to define and recognize the definitions of the following terms:

- a. Forward contract, Prepaid forward contract
- b. Outright purchase, Fully leveraged purchase
- c. Implied repo rate
- d. Cost of carry
- e. Lease rate
- f. Futures contract

2. The candidate will be able to:

- a. Determine forward price from prepaid forward price.
- b. Explain the relationship between forward price and futures price.
- c. Explain the relationship between forward price and future stock price.
- d. Use the concept of no-arbitrage to determine the theoretical value of futures and forwards.
- e. Given any four of call premium, put premium, forward price, strike price and interest rate, calculate the remaining item using the put-call parity formula.

E. Swaps (0-5%)

1. The candidate will be able to define and recognize the definitions of the following terms:

- a. Swap, Prepaid swap
- b. Swap term, Swap spread, Notional Amount
- c. Simple commodity swap, Interest rate swap
- d. Deferred swap

2. The candidate will be able to use the concept of no-arbitrage to determine the theoretical values of swaps.

Text References

Knowledge and understanding of the financial mathematics concepts are significantly enhanced through working out problems based on those concepts. Thus, in preparing for the Financial Mathematics exam, whichever of the source textbooks candidates choose to use, candidates are encouraged to work out the textbook exercises related to the listed readings.

Suggested Textbooks for Learning Objectives in Section I, Interest Theory

There is not a single textbook required for the learning objectives in Section I. The texts listed below are representative of the textbooks available to cover the material on which the candidate may be tested. Not all topics may be covered at the same level in each text. The candidate may wish to use one or more texts in his/her preparation for the examination.

Broverman, S.A., *Mathematics of Investment and Credit* (Fifth Edition), 2010, ACTEX Publications:

- Chapter 1 (1.1-1.7)
- Chapter 2 (2.1 -2.4 excluding 2.4.2 and 2.4.3)
- Chapter 3 (3.1-3.3, excluding 3.2.1 and 3.2.2)
- Chapter 4 (4.1-4.3.1)
- Chapter 5 (5.1-5.3 excluding 5.1.4 and 5.3.2)
- Chapter 6 (6.1-6.3 excluding 6.2)
- Chapter 7 (7.1-7.2)
- Chapter 8 (8.1, 8.3.1 and 8.4.1–8.4.2)

Daniel, J.W., and Vaaler, L.J.F., *Mathematical Interest Theory* (Second Edition), 2009, The Mathematical Association of America: **[Candidates may also use the First Edition of *Mathematical Interest Theory* (Publisher: Prentice Hall). The same chapter references apply.]**

- Chapter 1 (1.3-1.12, 1.14)
- Chapter 2 (2.2-2.7)
- Chapter 3 (3.2-3.9, 3.11, 3.13)
- Chapter 4 (4.2-4.6)
- Chapter 5 (5.2-5.4)
- Chapter 6 (6.2-6.6, 6.9)
- Chapter 7 (7.1)
- Chapter 8 (8.3)
- Chapter 9 (9.1-9.5)

Kellison, S.G., *The Theory of Interest* (Third Edition), 2008, Irwin/McGraw-Hill:

- Chapter 1 (1.2-1.10)
- Chapter 2 (2.3-2.6)
- Chapter 3 (3.2-3.8)
- Chapter 4 (4.2-4.9)
- Chapter 5 (5.2-5.6)
- Chapter 6 (6.2-6.7, 6.10)
- Chapter 7 (7.2-7.7)
- Chapter 9 (9.4)
- Chapter 10 (10.2-10.5)
- Chapter 11 (11.2-11.8)

Ruckman, C.; and Francis, J., *Financial Mathematics: A Practical Guide for Actuaries and other Business Professionals* (Second Edition), 2005, BPP Professional Education:

Chapter 1

Chapter 2

Chapter 3 (3.1-3.9)

Chapter 4 (4.1-4.7)

Chapter 5

Chapter 6 (6.1-6.3 excluding 6.1.6-6.1.7)

Chapter 7 (7.1-7.9)

Chapter 8 (8.1-8.3)

Chan, Wai-Sum, and Tse, Yiu-Kuen, *Financial Mathematics for Actuaries*, 2011, McGraw-Hill Education (Asia):

Chapter 1

Chapter 2

Chapter 3

Chapter 4

Chapter 5

Chapter 6

Chapter 7

Chapter 8

plus [Supplementary Notes for Financial Mathematics for Actuaries](#)

Textbook for Learning Objectives in Section II, Financial Economics

McDonald, R.L., *Derivatives Markets* (Second Edition), 2006, Addison Wesley:

Chapter 1 (1.1-1.4)

Chapter 2 (2.1-2.6 and Appendix 2.A)

Chapter 3 (3.1-3.5)

Chapter 4 (4.1-4.4)

Chapter 5 (5.1-5.4 and Appendix 5.B)

Chapter 8 (8.1-8.2).

OTHER RESOURCES:

[Derivatives Markets, Errata](#), 2006 Second Edition, by R. McDonald

[Notation and terminology used for Exam FM/Exam 2](#)

[All released exam papers](#), since 2000, can be found here.

Exam FM/2 Sample [Questions](#) and [Solutions](#)

Samples [Questions](#) and [Solutions](#) for *Derivatives Markets*

[Review of Calculator Functions for the Texas Instruments BA-35](#)

[Review of Calculator Functions for the Texas Instruments BA II Plus](#)

Models for Financial Economics—November 2012

The Models for Financial Economics is called Exam MFE by the SOA and Exam 3F by the CAS. This three-hour exam consist of 30 multiple-choice questions. Also, a [normal distribution calculator](#) will be available during the test by clicking a link on the item screen. Details are available on the [Prometric Web Site](#). The examination is jointly sponsored and administered by the SOA, CAS, and the Canadian Institute of Actuaries (CIA). The examination is also jointly sponsored by the American Academy of Actuaries (AAA) and the Conference of Consulting Actuaries (CCA).

The purpose of the syllabus is to develop the candidate's knowledge of the theoretical basis of certain actuarial models and the application of those models to insurance and other financial risks. A thorough knowledge of calculus, probability, interest theory and the earlier chapters of the McDonald textbook (which are in the syllabus of Exam FM/2) is assumed.

Formulas are provided for the density and distribution functions for the standard normal and lognormal random variables. For paper and pencil examinations, tables of the standard normal distribution function are provided. Since the tables will be provided to the candidate at the examination, candidates will not be allowed to bring copies of the tables into the examination room. For CBT candidates, a normal distribution calculator is provided. See the link below for more information.

Note: It is anticipated that candidates will have done the relevant exercises in the textbooks.

Check the [Updates](#) section of the web site for any changes to the exam or syllabus.

The ranges of weights shown are intended to apply to the large majority of exams administered. On occasion, the weights of topics on an individual exam may fall outside the published range. Candidates should also recognize that some questions may cover multiple learning outcomes.

Each multiple-choice problem includes five answer choices identified by the letters A, B, C, D, and E, only one of which is correct. Candidates must indicate responses to each question on the computer.

As part of the computer-based testing process, a few pilot questions will be randomly placed in the exam (paper and pencil and computer-based forms). These pilot questions are included to judge their effectiveness for future exams, but they will NOT be used in the scoring of this exam. All other questions will be considered in the scoring. All unanswered questions are scored incorrect. Therefore, candidates should answer every question on the exam. There is no set requirement for the distribution of correct answers for the SOA/CAS/CIA multiple-choice preliminary examinations. It is possible that a particular answer choice could appear many times on an examination or not at all. Candidates are advised to answer each question to the best of their ability, independently from how they have answered other questions on the examination.

Since the CBT exam will be offered over a period of a few days, each candidate will receive a test form composed of questions selected from a pool of questions. Statistical scaling methods are used to ensure within reasonable and practical limits that, during the same testing period of a few days, all forms of the test are comparable in content and passing

criteria. The methodology that has been adopted is used by many credentialing programs that give multiple forms of an exam.

LEARNING OUTCOMES – MODELS FOR FINANCIAL ECONOMICS

- A. Interest rate models (10-15%)
 - 1. Evaluate features of the Vasicek and Cox-Ingersoll-Ross bond price models.
 - 2. Explain why the time-zero yield curve in the Vasicek and Cox-Ingersoll-Ross bond price models cannot be exogenously prescribed.
 - 3. Construct a Black-Derman-Toy binomial model matching a given time-zero yield curve and a set of volatilities.

- B. Rational valuation of derivative securities (65-75%)
 - 1. Use put-call parity to determine the relationship between prices of European put and call options and to identify arbitrage opportunities.
 - 2. Calculate the value of European and American options using the binomial model.
 - 3. Calculate the value of European options using the Black-Scholes option-pricing model.
 - 4. Identify the situations where the values of European and American options are the same.
 - 5. Interpret the option Greeks.
 - 6. Explain the cash flow characteristics of the following exotic options: Asian, barrier, compound, gap, and exchange.
 - 7. Explain the properties of a lognormal distribution and explain the Black-Scholes formula as an expected value for a lognormal distribution.
 - 8. Explain what it means to say that stock prices follow a diffusion process.
 - 9. Apply Itô's lemma in the one-dimensional case.

- C. Simulation (10-15%)
 - 1. Simulate lognormal stock prices.
 - 2. Use variance reduction techniques to accelerate convergence.

- D. Risk management techniques (5-10%)
 - 1. Explain and demonstrate how to control risk using the method of delta-hedging.

Note: Concepts, principles and techniques needed for Exam MFE/3F are covered in the reference listed below. Candidates and professional educators may use other references, but candidates should be very familiar with the notation and terminology used in the listed references.

Texts – Models for Financial Economics*

Derivatives Markets (Second Edition), 2006, by McDonald, R.L.,

Chapter 9,

Chapter 10, (excluding "Options on Commodities" on page 334),

Chapter 11, Sections 11.1 – 11.4, Appendices 11.A and 11.B,

Chapter 12, Sections 12.1–12.5, Appendix 12.A,

Chapter 13, including Appendix 13.B,

Chapter 14,

Chapter 18,

Chapter 19, Sections 19.1–19.5

Chapter 20, Sections 20.1–20.6 (up to but excluding “Multivariate Itô’s Lemma” on pages 665-666) and 20.7 (up to but excluding “Valuing a Claim on S^aQ^b ” on pages 670-672 and excluding “Finding the lease rate” on top one-half of page 669),

Chapter 21, Sections 21.1 – 21.2 (excluding “What If the Underlying Asset Is Not an Investment Asset” on pages 688-690) and 21.3 (excluding “The Backward Equation” on pages 691-692, and excluding the paragraph on page 692 that begins “If a probability...” and through the end of the section),

Chapter 22, Section 22.1 (but with only those definitions in Tables 22.1 and 22.2 that are relevant to Section 22.1),

Chapter 23, Sections 23.1 – 23.2 (pp.744 thru the middle of p.746 only),

Chapter 24, Sections 24.1–24.5 (up to but excluding “Forward rate agreements” on pages 806-808),

Appendix B.1, Appendix C and including relevant Errata (see below).

Unless otherwise stated chapter appendices are not included in the required readings from this text.

***Any textbook errata are included below.**

Other Resources – Models for Financial Economics

[Exam MFE/Exam 3F Formulas and Tables for paper/pencil](#)

Formulas and Tables for CBT:

- A [normal distribution calculator](#) will be available during the test by clicking buttons on the item screen.
- [Formula document](#)

[Some Remarks on Derivatives Markets](#)

Derivatives Markets, Errata 2006 Second Edition, by R. McDonald,
<http://www.kellogg.northwestern.edu/faculty/mcdonald/htm/typos2e.html>

[All released exam papers](#), since 2000 can be found here.

[Exam MFE/3F Sample Questions and Solutions \(1-76\)](#)

Construction and Evaluation of Actuarial Models Exam

The Construction and Evaluation of Actuarial Models exam is called Exam C by the SOA and Exam 4 by the CAS. This three-and-a-half hour exam consists of 35 multiple-choice questions. Also, a preview of the CBT layout of the [Exam C/4 tables](#) in HTML is available online since the tables have been divided into five sections for viewing purposes.

The examination is jointly sponsored and administered by the SOA, CAS, and the Canadian Institute of Actuaries (CIA). The examination is also jointly sponsored by the American Academy of Actuaries (AAA) and the Conference of Consulting Actuaries (CCA).

The Construction and Evaluation of Actuarial Models Exam is administered as a computer-based test. For additional details, please refer to [Exam Rules](#). The syllabus for this examination provides an introduction to modeling and covers important actuarial methods that are useful in modeling. A thorough knowledge of calculus, probability, and mathematical statistics is assumed.

The candidate will be introduced to useful frequency and severity models beyond those covered in Exam M. The candidate will be required to understand the steps involved in the modeling process and how to carry out these steps in solving business problems. The candidate should be able to: 1) analyze data from an application in a business context; 2) determine a suitable model including parameter values; and 3) provide measures of confidence for decisions based upon the model. The candidate will be introduced to a variety of tools for the calibration and evaluation of the models.

A variety of tables is available below for the candidate and will be provided to the candidate at the examination. These include values for the standard normal distribution, chi-square distribution, and abridged inventories of discrete and continuous probability distributions. Candidates will not be allowed to bring copies of the tables into the examination room.

Check the [Updates](#) section on this exam's home page for any changes to the exam or syllabus.

The ranges of weights shown are intended to apply to the large majority of exams administered. On occasion, the weights of topics on an individual exam may fall outside the published range. Candidates should also recognize that some questions may cover multiple learning outcomes.

Each multiple-choice problem includes five answer choices identified by the letters A, B, C, D, and E, only one of which is correct. Candidates must indicate responses to each question on the computer.

As part of the computer-based testing process, a few pilot questions will be randomly placed in the exam (paper and pencil and computer-based forms). These pilot questions are included to

judge their effectiveness for future exams, but they will NOT be used in the scoring of this exam. All other questions will be considered in the scoring. All unanswered questions are scored incorrect. Therefore, candidates should answer every question on the exam. There is no set requirement for the distribution of correct answers for the SOA/CAS/CIA multiple-choice preliminary examinations. It is possible that a particular answer choice could appear many times on an examination or not at all. Candidates are advised to answer each question to the best of their ability, independently from how they have answered other questions on the examination.

Since the CBT exam will be offered over a period of a few days, each candidate will receive a test form composed of questions selected from a pool of questions. Statistical scaling methods are used to ensure within reasonable and practical limits that, during the same testing period of a few days, all forms of the test are comparable in content and passing criteria. The methodology that has been adopted is used by many credentialing programs that give multiple forms of an exam.

LEARNING OUTCOMES

The candidate is expected to be familiar with survival, severity, frequency and aggregate models, and use statistical methods to estimate parameters of such models given sample data. The candidate is further expected to identify steps in the modeling process, understand the underlying assumptions implicit in each family of models, recognize which assumptions are applicable in a given business application, and appropriately adjust the models for impact of insurance coverage modifications.

Specifically, the candidate is expected to be able to perform the tasks listed below:
Sections A–E have a combined weight of 15-20%

A. Severity Models

1. Calculate the basic distributional quantities:
 - a) moments
 - b) Percentiles
 - c) Generating functions
2. Describe how changes in parameters affect the distribution.
3. Recognize classes of distributions and their relationships.
4. Apply the following techniques for creating new families of distributions:
 - a) Multiplication by a constant
 - b) Raising to a power
 - c) Exponentiation,
 - d) Mixing
5. Identify the applications in which each distribution is used and reasons why.
6. Apply the distribution to an application, given the parameters.

7. Calculate various measures of tail weight and interpret the results to compare the tail weights.

B. Frequency Models

For the Poisson, Mixed Poisson, Binomial, Negative Binomial, Geometric distribution and mixtures thereof:

1. Describe how changes in parameters affect the distribution,
2. Calculate moments,
3. Identify the applications for which each distribution is used and reasons why,
4. Apply the distribution to an application given the parameters.
5. Apply the zero-truncated or zero-modified distribution to an application given the parameters

C. Aggregate Models

1. Compute relevant parameters and statistics for collective risk models.
2. Evaluate compound models for aggregate claims.
3. Compute aggregate claims distributions.

D. For severity, frequency and aggregate models

1. Evaluate the impacts of coverage modifications:
 - a) Deductibles
 - b) Limits
 - c) Coinsurance
2. Calculate Loss Elimination Ratios.
3. Evaluate effects of inflation on losses.

E. Risk Measures

1. Calculate VaR, and TVaR and explain their use and limitations.

F. Construction of Empirical Models (20-25%)

1. Estimate failure time and loss distributions using:
 - a) Kaplan-Meier estimator, including approximations for large data sets
 - b) Nelson-Åalen estimator
 - c) Kernel density estimators
2. Estimate the variance of estimators and confidence intervals for failure time and loss distributions.
3. Apply the following concepts in estimating failure time and loss distribution:
 - a) Unbiasedness
 - b) Consistency
 - c) Mean squared error

G. Construction and Selection of Parametric Models (25-30%)

1. Estimate the parameters of failure time and loss distributions using:
 - a) Maximum likelihood

- b) Method of moments
- c) Percentile matching
- d) Bayesian procedures
2. Estimate the parameters of failure time and loss distributions with censored and/or truncated data using maximum likelihood.
3. Estimate the variance of estimators and the confidence intervals for the parameters and functions of parameters of failure time and loss distributions.
4. Apply the following concepts in estimating failure time and loss distributions:
 - a) Unbiasedness
 - b) Asymptotic unbiasedness
 - c) Consistency
 - d) Mean squared error
 - e) Uniform minimum variance estimator
5. Determine the acceptability of a fitted model and/or compare models using:
 - a) Graphical procedures
 - b) Kolmogorov-Smirnov test
 - c) Anderson-Darling test
 - d) Chi-square goodness-of-fit test
 - e) Likelihood ratio test
 - f) Schwarz Bayesian Criterion

H. Credibility (20-25%)

1. Apply limited fluctuation (classical) credibility including criteria for both full and partial credibility.
2. Perform Bayesian analysis using both discrete and continuous models.
3. Apply Bühlmann and Bühlmann-Straub models and understand the relationship of these to the Bayesian model.
4. Apply conjugate priors in Bayesian analysis and in particular the Poisson-gamma model.
5. Apply empirical Bayesian methods in the nonparametric and semiparametric cases.

I. Simulation (5-10%)

1. Simulate both discrete and continuous random variables using the inversion method.
2. Estimate the number of simulations needed to obtain an estimate with a given error and a given degree of confidence.
3. Use simulation to determine the p-value for a hypothesis test.
4. Use the bootstrap method to estimate the mean squared error of an estimator.
5. Apply simulation methods within the context of actuarial models.

Reading Selections for learning outcomes A through G and I:

Texts

Candidates may prepare for this exam using either the Third or Fourth Editions.

- *Loss Models: From Data to Decisions*, (Third Edition), 2008, by Klugman, S.A., Panjer, H.H. and Willmot, G.E.,

Chapter 3

Chapter 4

Chapter 5, Sections 5.1– 5.4 only

Chapter 6, Sections 6.1– 6.5 and 6.7

Chapter 8

Chapter 9, Sections 9.1–9.7 (excluding 9.6.1 and examples 9.9 and 9.11), Sections 9.11.1–9.11.2

Chapter 12

Chapter 13

Chapter 14

Chapter 15, Sections 15.1– 15.6.4, 15.6.6 only

Chapter 16

Chapter 21, Sections 21.1–21.2 (excluding 21.2.4)

- *Loss Models: From Data to Decisions*, (Fourth Edition), 2012, by Klugman, S.A., Panjer, H.H. and Willmot, G.E.,

Chapter 3

Chapter 4

Chapter 5, Sections 5.1– 5.4 only, excluding Section 5.3.4.

Chapter 6, Sections 6.1– 6.6

Chapter 8

Chapter 9, Sections 9.1–9.7 (excluding 9.6.1), Sections 9.8.1–9.8.2

Chapter 10

Chapter 11

Chapter 12 (Sections 12.1 – 12.3)

[Section 14.4 from the Third Edition](#)

Chapter 13, Sections 13.1– 13.4

Chapter 14, Sections 14.1 – 14.4 and 14.6

Chapter 15

Chapter 16

Chapter 20, Sections 20.1 and 21.3–21.4

Reading Options for learning outcome H (Credibility) will be:

Option A

Candidates may prepare for this exam using either the Third or Fourth Editions.

- *Loss Models: From Data to Decisions*, (Third Edition), 2008, by Klugman, S.A., Panjer, H.H., and Willmot, G.E.

Chapter 20, Sections 20.2, 20.3 (excluding 20.3.8), 20.4 (excluding 20.4.3)

- *Loss Models: From Data to Decisions*, (Fourth Edition), 2012, by Klugman, S.A., Panjer, H.H., and Willmot, G.E.

Chapter 17, Sections 17.2 – 17.7

Chapter 18

Chapter 19

Option B

- [*Foundations of Casualty Actuarial Science*](#) (Fourth Edition), 2001, Casualty Actuarial Society
Chapter 8, Section 1 (background only) Sections 2–5
- [*Topics in Credibility*](#) by Dean, C.G.

Option C

- *Introduction to Credibility Theory* (Fourth Edition), 2010, Herzog, T.N.
Chapter 1-3 (background only)
Chapters 4–8
Chapter 9 (background only)

Other Resources

[Tables for Exam C/Exam 4](#)

[Preview of the CBT layout of the Exam C/4 tables in HTML](#)

[Loss Models Errata Third Edition](#)

All released exam papers since 2000, can be found at:

[Past Exam Questions and Solutions](#)

Exam C/4 Sample [Questions](#) and [Solutions](#)

2012-2013 CAS Online Course 1 Risk Management and Insurance Operations

Risk Management and Insurance Operations is called Online Course 1 by the CAS and CA1 by The Institutes. (Prometric lists this course as CAS1 on its Web site under The Institutes.) Online Course 1/CA1 prepares CAS candidates for a two-hour, seventy-five-point multiple-choice examination. The online course and exam were developed collaboratively with The Institutes. The online course is available through the [CAS Online Courses Web Page](#) on The Institutes' Web Site. Similarly, the exam is administered by The Institutes at Prometric test centers during four, two-month testing windows annually.

The CAS will grant a waiver of CAS Online Course 1 to those who have the Chartered Property Casualty Underwriter (CPCU) designation.

The study material for CAS Course 1/CA1 is contained in the online course access. The fee for access to the online course includes one attempt at passing the exam. Candidates are required to purchase the online course to obtain access to the exam. Exam retakes may be purchased separately if needed.

Purchasing the course requires that candidates declare the testing window in which they are planning to take the exam. To register for the exam, a candidate must:

- Call The Institutes at (800) 644-2101 or (610) 644-2100, extension 6000, to register for the exam itself. This will place the candidate on an eligibility list for Prometric.
- Then make an appointment with Prometric for a specific date and time during the testing window. Early registration for the exam is strongly encouraged as seats fill quickly. There is a \$105 fee for changing testing windows.
- Schedule your appointment when you know you will be ready to sit for the exam. Effective January 1, 2012, Prometric will charge a \$50 fee to candidates who reschedule their appointments between 3 to 12 business days of a test date. Changes to the appointment date/time are not permitted within 3 business days of the appointment.

Questions or concerns regarding CAS Online Course 1/CA1 should be directed to The Institutes' Customer Service Department at (800) 644-2101 or (610) 644-2100, extension 6000, or CustomerService@TheInstitutes.org.

Assignment 1: Introduction to Risk Management

MODULE TITLE	LEARNING OBJECTIVE
Understanding and Quantifying Risk	Describe each of the following in the context of risk: <ul style="list-style-type: none"> • Uncertainty • Possibility • Possibility compared with probability
Classifications of Risk	Explain how the following classifications of risk apply and how they help in risk management: <ul style="list-style-type: none"> • Pure and speculative risk • Subjective and objective risk • Diversifiable and nondiversifiable risk • Quadrants of risk (hazard, operational, financial, and strategic)

Financial Consequences of Risk	Describe the three financial consequences of risk.
Basic Purpose and Scope of Risk Management	Describe the basic purpose and scope of risk management in terms of the following: <ul style="list-style-type: none"> • How risk management is practiced by individuals and organizations • The basic distinction between traditional risk management and enterprise-wide risk management
Loss Exposures	Describe the following elements of property, liability, personnel, and net income loss exposures: <ul style="list-style-type: none"> • Assets exposed to loss • Causes of loss, including associated hazards • Financial consequences of loss
Risk Management Benefits	Describe the benefits of risk management and how it reduces the financial consequences of risk for individuals, organizations, and society.
Risk Management Program Goals	Summarize pre-loss and post-loss risk management program goals and the conflicts that can arise as they are implemented.
The Risk Management Process	Describe each of the steps in the risk management process

Assignment 2: Risk Control

MODULE TITLE	LEARNING OBJECTIVE
Risk Control Techniques	Describe the six categories of risk control techniques in terms of the following: <ul style="list-style-type: none"> • Whether each reduces loss frequency, reduces loss severity, or makes losses more predictable • How each can be used to address a particular loss exposure • How they differ from one another
Risk Control Goals	Explain how an organization can use risk control techniques and measures to achieve the following risk control goals: <ul style="list-style-type: none"> • Implement effective and efficient risk control measures • Comply with legal requirements • Promote life safety • Ensure business continuity
Application of Risk Control Techniques	Explain how risk control techniques can be applied to property, liability, personnel, and net income loss exposures.
Business Continuity Management	Describe business continuity management in terms of its scope, the process used to implement it, and the contents of a typical business continuity plan.

Assignment 3: Risk Financing

MODULE TITLE	LEARNING OBJECTIVE
Risk Financing Goals	<p>Explain how individuals or organizations can achieve their overall and risk management goals by fulfilling the following risk financing goals:</p> <ul style="list-style-type: none"> • Pay for losses • Manage the cost of risk • Manage cash flow variability • Maintain an appropriate level of liquidity • Comply with legal requirements
Retention and Transfer	<p>Describe the following aspects of retention and transfer:</p> <ul style="list-style-type: none"> • Retention funding measures • Limitations on risk transfer measures • The advantages of both retention and transfer
Selecting Appropriate Risk Financing Measures	<p>Explain how the following can affect the selection of the appropriate risk financing measure:</p> <ul style="list-style-type: none"> • Ability of a risk financing measure to meet risk financing goals • Loss exposure characteristics • Characteristics specific to an individual or organization
Risk Financing Measures	<p>Explain how an organization meets its risk financing goals by using the following risk financing measures:</p> <ul style="list-style-type: none"> • Guaranteed cost insurance • Self-insurance • Large deductible plans • Captives • Finite risk plans • Pools • Retrospective rating plans • Hold-harmless agreements • Capital market solutions

Assignment 4: Enterprise-Wide Risk Management

MODULE TITLE	LEARNING OBJECTIVE
Traditional Risk Management Versus ERM	Contrast traditional risk management and ERM.
Improving Strategic Decision Making With ERM	Explain how an organization can improve its strategic decision making by incorporating enterprise-wide risk management (ERM).
ERM in Approaching Business Uncertainties	Explain why ERM is an effective approach to use to face business uncertainties.
Major Risk Management Frameworks and Standards	Summarize the main risk management frameworks and standards.

Assignment 5: Insurance as a Risk Management Technique

MODULE TITLE	LEARNING OBJECTIVE
How Insurance Reduces Risk	Explain how insurance reduces risk through pooling.
Benefits of Insurance	Explain how insurance benefits individuals, organizations, and society.
Characteristics of an Ideally Insurable Loss Exposure	Explain why each of the six characteristics of an ideally insurable loss exposure is important to the insurance mechanism.
Insurability of Commercial Loss Exposures	Explain how the six characteristics of an ideally insurable loss exposure apply to commercial loss exposures.
Insurability of Personal Loss Exposures	Explain how the six characteristics of an ideally insurable loss exposure apply to personal loss exposures.
Government Insurance Programs	Explain how state and federal governments are involved in the insurance market and the rationale for, and level of, their involvement.

Assignment 6: Overview of Insurance Operations

MODULE TITLE	LEARNING OBJECTIVE
Classifications of Insurers	Explain how insurers have organized to provide property-casualty insurance.
Insurer Goals	Describe the major goals of an insurer.
Constraints on Achieving Insurer Goals	Describe the internal and external constraints that impede insurers from achieving their major goals.
Measuring Insurer Performance	Describe the measurements used to evaluate how successful an insurer is at meeting its established goals.
Functional View of Insurance	Describe the core and supporting functions performed by insurers.

Assignment 7: Insurance Marketing and Distribution

MODULE TITLE	LEARNING OBJECTIVE
Property-Casualty Insurance Marketplace	Describe the following attributes of the competitive property-casualty insurance marketplace: distinguishing characteristics of insurance customers, insurer marketing differentiations, and unique factors in the insurance marketplace.
Insurer Marketing Activities	Explain how typical insurer marketing activities are performed and why they are performed.
Insurance Distributions Systems and Channels	Describe the main types of insurance distribution systems and channels, including the principal characteristics that distinguish one distribution system from another.
Functions of Insurance Producers	Describe the functions performed by insurance producers.

Distribution System and Channel Selection for Insurance Marketing	Describe the key factors an insurer should evaluate during the distribution-system and distribution-channel selection process.
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Assignment 8: The Underwriting Function

MODULE TITLE	LEARNING OBJECTIVE
Purpose of Underwriting	Describe the purpose of underwriting.
Underwriting Activities	Describe the underwriting activities typically performed by line and staff underwriters.
Underwriting Authority	Describe the importance of compliance with underwriting authority in individual account selection.
Constraints in Establishing Underwriting Policy	Describe the constraining factors considered in the establishment of underwriting policy.
Implementing Underwriting Policy	Describe the purposes that underwriting guidelines and underwriting audits serve.
Underwriting Process	Describe the steps in the underwriting process.
Measuring Underwriting Results	Explain how an insurer's underwriting results are measured and how financial measures can be distorted.

Assignment 9: Underwriting Property and Liability Insurance

MODULE TITLE	LEARNING OBJECTIVE
Underwriting Property Insurance Using the COPE Model	Describe in detail each of the COPE factors used to evaluate property loss exposures.
Property Policy Provision Underwriting Considerations	Explain how insurable interest, policy provisions for valuing losses, and insurance to value affect a loss payment amount under property insurance.
Measures of Potential Loss Severity	Explain how underwriters use policy amount, amount subject, normal loss expectancy (NLE), probable maximum loss (PML), and maximum foreseeable loss (MFL) to measure potential loss severity.
Underwriting Business Income and Extra Expense Coverage	Describe the underwriting considerations for business income and extra expense coverage.
Underwriting Commercial Crime Insurance	Describe the underwriting considerations and risk control techniques associated with employee dishonesty and crimes committed by others.
Underwriting Commercial General Liability Insurance	Describe the loss exposures and the underwriting considerations for commercial general liability insurance.
Underwriting Personal and Commercial Auto Insurance	Describe the underwriting considerations for personal and commercial auto insurance.
Underwriting Workers Compensation Insurance	Describe the underwriting considerations for workers compensation insurance.
Underwriting Umbrella and Excess Liability Insurance	Describe the underwriting considerations for umbrella and excess liability insurance.

Assignment 10: Risk Control and Premium Auditing

MODULE TITLE	LEARNING OBJECTIVE
Insurer Risk Control Goals	Describe the goals of insurer risk control activities.
Risk Control Services Provided by Insurers	Describe the risk control services provided by insurers.
Cooperation Between Risk Control and Other Insurer Functions	Explain how risk control cooperates with other insurer functions.
Reasons for Premium Auditing	Explain why premium audits are conducted.
Premium Auditing Process	Describe the premium auditing process.
Importance of Accurate Premium Audits	Explain why premium audits must be accurate.
Premium Auditing Contributions	Explain how premium auditing contributes to other insurer functions.

Assignment 11: The Claim Function

MODULE TITLE	LEARNING OBJECTIVE
Overview of the Claim Function	Identify the goals of the claim function, the users of claim information, and the parties with whom claim personnel interact.
Claim Department	Describe the claim department structure, types and functions of claim personnel, and claim personnel performance measures.
Claim Handling Process	Describe the following activities in the claim handling process: <ul style="list-style-type: none"> • Acknowledging and assigning the claim • Identifying the policy and setting reserves • Contacting the insured or the insured's representative • Investigating the claim • Documenting the claim • Determining the cause of loss, liability, and the loss amount • Concluding the claim
Law of Bad Faith	Explain how the law of bad faith relates to an insurer's duty of good faith and fair dealing and how the legal environment affects the law of bad faith.
Elements of Good-Faith Claim Handling	Describe the elements of good-faith claim handling.

Assignment 12: Adjusting Property and Liability Claims

MODULE TITLE	LEARNING OBJECTIVE
Property Claim Handling Process	Explain how and why the activities in the framework for handling property claims are accomplished.
Handling Specific Types of Property Claims	Describe the challenges of handling the following types of property claims: <ul style="list-style-type: none"> • Residential dwelling claims • Residential personal property claims • Commercial structure claims • Business income claims • Merchandise claims • Transportation and bailment claims • Catastrophe claims
Liability Claim Handling Process	Explain how and why the activities in the framework for handling a liability claim are accomplished.
Handling Specific Types of Liability Claims	Describe the challenges of handling each of the following types of claims: <ul style="list-style-type: none"> • Auto bodily injury liability claims • Auto property damage claims • Premises liability claims • Operations liability claims • Products liability claims • Workers compensation claims • Professional liability claims
Case Study: Applying the Framework for Coverage Analysis and the Claim Handling Process	Given a claim, determine coverage for a loss using the framework for coverage analysis and the activities in the claim handling process.

Assignment 13: Reinsurance

MODULE TITLE	LEARNING OBJECTIVE
Reinsurance and Its Functions	Describe reinsurance and its principal functions.
Reinsurance Sources	Describe the three sources of reinsurance.
Reinsurance Transactions	Describe treaty reinsurance and facultative reinsurance.
Types of Reinsurance	Describe the types of pro rata reinsurance and excess of loss reinsurance and their uses.
Alternatives to Traditional Reinsurance	Describe finite risk reinsurance and other methods that rely on capital markets as alternatives to traditional and non-traditional reinsurance.
Reinsurance Program Design	Describe the factors that should be considered in the design of a reinsurance program.
Case Studies in Reinsurance Program Design	Given a case, identify the reinsurance needs of an insurer and recommend an appropriate reinsurance program to meet those needs.
Reinsurance Regulation	Explain how reinsurance is regulated.

Assignment 14: Insurer Strategic Management

MODULE TITLE	LEARNING OBJECTIVE
Strategic Management Process	Describe the strategic management process.
The Five Forces and SWOT Methods of Analyzing the Environment	Explain how the Five Forces and SWOT methods can be used to analyze the environment in which an insurer operates.
Determining Strategy at Different Organizational Levels	Explain how strategies are developed at the corporate, business, functional, and operational levels.
Insurers Global Expansion	Describe the strategic reasons, considerations, and approaches for insurers to expand their operations globally.
Strategic Management Case Study	Given information about an insurer's business strategies, conduct a SWOT analysis to evaluate its strategy.

Assignment 15: The Underwriting Cycle

MODULE TITLE	LEARNING OBJECTIVE
The Insurance Underwriting Cycle	Describe the phases of the insurance underwriting cycle and the strategies normally used by insurers and producers during each phase.
Financial Factors Influencing the Underwriting Cycle	Explain how the following financial factors influence underwriting cycles
Effects of Supply and Demand on the Underwriting Cycle	Explain how the theory of demand and supply applies to insurance and the underwriting cycle.

Assignment 16: Actuarial Data Management

MODULE TITLE	LEARNING OBJECTIVE
Data Quality	Summarize <ul style="list-style-type: none"> • The concepts of data quality and information quality • The impact of data quality on the actuarial work product
Principles of Data Quality	Given a principle of data quality, provide an example that illustrates the principle.
Data Quality—ASOP No. 23	Given a concept from the Actuarial Standard of Practice No. 23, provide an example of its application or use.
Life Cycle for Insurance Data	For each step in the life cycle for insurance data, describe the purpose, the responsible parties, and errors typically encountered.
Metadata	Summarize metadata including: <ul style="list-style-type: none"> • How metadata are defined • The actuary's role in creating and sharing metadata • How metadata are shared across an organization • The data collected under different statistical plans

The Need for Aggregate Insurance Statistical Data	Explain the regulatory and business needs for statistical data.
Types of Statistical Plans	Summarize the relationship of Statistical Plans to insurance rating elements and the two basic types of Statistical Plans: <ul style="list-style-type: none"> • Summary-based Statistical Plans • Transaction-based Statistical Plans
Insurance Data Elements: Date Fields and Amount Fields in Statistical Plans	Describe the functions of the date field and amount field data elements in a statistical plan.
Insurance Data Elements: Classification or Rating Variable Fields and Exposure Data Elements	Describe the following statistical plan data elements by line of business: <ul style="list-style-type: none"> • Classification and Rating Elements • Exposure
Techniques and Applications to Improve Information Quality	Summarize the following data quality analysis concepts: <ul style="list-style-type: none"> • Exploratory data analysis • Data cubes • Identifying missing data • Descriptive statistics • Box and whisker plots
Auditing Data and the Actuary's Responsibility in Assessing Data Reasonability	Explain the following: <ul style="list-style-type: none"> • The purpose and steps of data auditing • An actuary's responsibility in assessing data reasonability

Study Materials for CAS Online Course 1

The online course itself contains learning objectives and all the educational material to meet these objectives and successfully complete the exam. The course fee includes one attempt at the exam.

The following printed materials are supplemental and may also be purchased from The Institutes, but are not required:

- **Textbook** contains material that is identical to the online course—only in a hardcopy format.
- **Review Notes** is a condensed version of the textbook.
- **Course Guide** contains sample questions and answers.
- **Flashcards** contain key words and phrases.

The materials described above may be purchased individually or in various package combinations.

Questions about potentially defective questions or material should be directed to The Institutes' Customer Service Department at (800) 644-2101 or (610) 644-2100, extension 6000, or CustomerService@TheInstitutes.org.

Publisher and Distributor

CAS Online Course 1/CA1 is available through The Institutes.

The Institutes, 720 Providence Road, Suite 100, Malvern, PA 19355-3433; telephone: (800) 644-2101 or (610) 644-2100 extension 6000; E-mail: CustomerService@TheInstitutes.org; Web Site Page for CAS Online Courses: www.aicpcu.org/cas.htm.

Exam Results

Candidates taking this computer-based test will receive unofficial pass/fail results at the conclusion of

their exam. The unofficial pass/fail result will be displayed on the computer screen at the conclusion of the exam. In most test centers, a printed copy of the candidate's unofficial pass/fail result will be available upon completion of the computer-based test from the proctor in the administrative area outside the testing room. The candidate, however, should carefully read the result that is displayed on the computer screen at the conclusion of the exam.

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CAS Online Course 2, Second Edition Insurance Accounting, Coverage Analysis, Insurance Law, and Insurance Regulation

Notice about the 1st and 2nd Editions

1st Edition: The original CAS Online Course 2 (CA2, 1st Edition) was revised effective September 1, 2012. Although the 1st Edition of CA2 is no longer available for sale after August 31, 2012, for those who purchased the 1st Edition, the original online course will be available and unchanged through June 15, 2013. The exam for the 1st Edition of CA2 will be offered through June 15, 2013.

2nd Edition: CA2, 2nd Edition, is the current version that became effective on September 1, 2012. Exams on this content will be offered for the first time on January 15, 2013.

Insurance Accounting, Coverage Analysis, Insurance Law, and Insurance Regulation is called Online Course 2 by the CAS and CA2, 2nd Edition, by The Institutes. Prometric lists this course as CAS2 on its website under The Institutes. (The 1st Edition will be tested throughout 2012. From January 15, 2013 through June 15, 2013, both editions will be tested—those who purchased the 1st Edition through The Institutes will receive the test for the 1st Edition; those who purchased the 2nd Edition will receive the test for the 2nd Edition.)

Online Course 2/CA2 prepares CAS candidates for a two-hour, seventy-five-point, multiple-choice examination. The online course and exam were developed collaboratively with The Institutes. The online course is available through the [Casualty Actuarial Society Online Courses Web page](#) on The Institutes' website. Similarly, the exam is administered by The Institutes at Prometric test centers during four, two-month testing windows annually.

The study material for CAS Course 2/CA2 is contained in the online course access. The fee for access to the online course includes one attempt at passing the exam. Candidates are required to purchase the online course to obtain access to the exam. Exam retakes may be purchased separately if needed.

Purchasing the course requires that candidates declare the testing window in which they are planning to take the exam. To register for the exam, a candidate must:

- Call The Institutes at (800) 644-2101 or (610) 644-2100, extension 6000, to register for the exam itself. This will place the candidate on an eligibility list for Prometric.
- Then make an appointment with Prometric for a specific date and time during the testing window. Early registration for the exam is strongly encouraged as seats fill quickly. There is a \$105 fee for changing testing windows.
- Schedule your appointment when you know you will be ready to sit for the exam. Prometric will charge a \$50 fee to candidates who reschedule their appointments between 3 to 12 business days of a test date. Changes to the appointment date/time are not permitted within 3 business days of the appointment.

Questions or concerns regarding CAS Online Course 2/CA2 should be directed to The Institutes' Customer Service Department at (800) 644-2101 or (610) 644-2100, extension 6000, or CustomerService@TheInstitutes.org.

Assignment 1: Introductory Insurance Accounting

MODULE TITLE	LEARNING OBJECTIVE
Qualitative Accounting Information Criteria	<p>Explain the following qualitative accounting information criteria:</p> <ul style="list-style-type: none"> • Understandability • Relevance • Reliability • Comparability and consistency • Lack of bias • Cost-benefit effectiveness
Types of Accounting Frameworks	<p>Describe the frameworks and the intended users and focus of each of the following sets of accounting frameworks:</p> <ul style="list-style-type: none"> • Generally Accepted Accounting Principles (GAAP) accounting • Regulatory/supervisory accounting • Tax accounting • Management accounting
Accounting Frameworks and Rule Hierarchies	<p>Explain the concept of a rule hierarchy and the sources of the following accounting frameworks:</p> <ul style="list-style-type: none"> • Generally Accepted Accounting Principles (GAAP) • Regulatory/supervisory accounting • Tax accounting
Selected Accounting Concepts	<p>Summarize the following accounting concepts:</p> <ul style="list-style-type: none"> • Fair value versus historical cost • Recognition versus measurement • Deferral-matching versus asset-liability • Impairment • Revenue recognition • Reporting segment • Liquidation versus going concern • Change in accounting principle versus change in accounting estimate • Principle-based versus rule-based
Fundamentals of Insurer Financial Statements	<p>Describe the purpose and primary components of these key schedules of an insurer's financial statements:</p> <ul style="list-style-type: none"> • Balance sheet • Income statement • Cash flow statement • Notes and disclosures
Premium Accounting—Revenue Recognition	<p>Explain how and when insurers recognize premium revenue in their financial statements under deferral-matching and asset-liability approaches.</p>
Premium Accounting—Types of Written Premium	<p>Distinguish between the various types of written premium and policy transactions that may not be classified as premium.</p>

Other Premium Accounting Issues	<p>Summarize the implications of these premium accounting issues:</p> <ul style="list-style-type: none"> • Financing—premiums versus service charges • Earning premium before it is written • Extended reporting endorsements (definite versus indefinite periods) • Reinsurance lags • Large deductible credits
Unearned Premium	<p>Summarize the purpose of unearned premium and these issues associated with how premiums are earned over time:</p> <ul style="list-style-type: none"> • Pro rata and non-pro rata approaches to earning premium • Multiyear policies • Liability adequacy test and the premium deficiency reserve
The Relationship Between Loss Reserves and the Unearned Premium Reserve	<p>Explain the relationship between loss reserves and the unearned premium reserve.</p>
Loss and Loss Adjustment Expense Accounting	<p>Describe the following issues related to loss and loss adjustment expense (LAE) accounting:</p> <ul style="list-style-type: none"> • Loss accounts • Loss cycle • Paid loss versus cash payment • Recoverable amounts • Accounting for discounted reserves • Self-insurer issues
Reinsurance Accounting Basics	<p>Explain the accounting and financial reporting considerations, including how values in insurers' financial reports are influenced by lags in the reporting of reinsurance transactions and bordereau reporting, for these types of reinsurance:</p> <ul style="list-style-type: none"> • Assumed reinsurance • Ceded reinsurance • Commutations • Prospective versus retroactive reinsurance
Deposit Accounting	<p>Explain the conditions under which an accounting framework may require deposit accounting for an insurance contract, and the operation of three general forms of deposit accounting rules.</p>

Assignment 2: Insurance Policy Analysis

MODULE TITLE	LEARNING OBJECTIVE
Distinguishing Characteristics of Insurance Policies	Describe the following characteristics of insurance policies, including common exceptions to these characteristics. <ul style="list-style-type: none"> • Indemnity • Utmost good faith • Fortuitous losses • Contract of adhesion • Exchange of unequal amounts • Conditional • Nontransferable
Structure of Insurance Policies	Describe these approaches to insurance policy structure and how they can affect policy analysis: <ul style="list-style-type: none"> • Self-contained and modular policies • Preprinted and manuscript policies • Standard and nonstandard forms • Endorsements and other related documents
Types of Policy Provisions	Describe the purpose(s) and characteristics of each of these types of policy provisions in a property-casualty insurance policy: <ul style="list-style-type: none"> • Declarations • Definitions • Insuring agreements • Exclusions • Conditions • Miscellaneous provisions
Insurance Policy Analysis	Describe the primary methods of insurance policy analysis.

Assignment 3: Common Policy Concepts

MODULE TITLE	LEARNING OBJECTIVE
Insurable Interest	Given a case, evaluate one or more entities' insurable interests.
Insurance to Value	Explain why insurance to value is important to property insurers, how insurers encourage insurance to value, and what insureds can do to address the problems associated with maintaining insurance to value.
Property Valuation Methods	Explain how property is valued under each of the following valuation methods in property insurance policies: <ul style="list-style-type: none"> • Actual cash value • Replacement cost • Agreed value • Functional valuation
Valuation of Liability Claims	Explain how the amount payable for a claim covered under a liability insurance policy is determined.

Reasons for Property Deductibles	Explain how deductibles in property insurance benefit the insured.
Liability Deductibles and Self-Insured Retentions	Explain when and why deductibles and self-insured retentions are appropriate for use in liability insurance.
Other Sources Of Recovery	Describe the multiple sources of recovery that may be available to an insurance policyholder for a covered loss.

Assignment 4: Personal Auto Policy: Liability, Medical Payments, and Uninsured Motorist Coverage

MODULE TITLE	LEARNING OBJECTIVE
Overview of the Personal Auto Policy	Summarize the sections of the Personal Auto Policy.
Declarations	Identify the types of information typically contained on the declarations page of a personal auto policy.
Definitions	Define the words and phrases included in the definitions section of the Personal Auto Policy.
Part A - Liability Coverage	Summarize each of the provisions in Part A—Liability Coverage of the Personal Auto Policy.
Part A - Liability Coverage Case	Given a case describing an auto liability claim, determine whether Part A—Liability Coverage of the Personal Auto Policy would cover the claim and, if so, the amount the insurer would pay for the claim.
Part B - Medical Payments Coverage	Summarize each of the provisions in Part B—Medical Payments Coverage of the Personal Auto Policy.
Part B - Medical Payments Coverage Case	Given a case describing an auto medical payments claim, determine whether Part B—Medical Payments Coverage of the Personal Auto Policy would cover the claim and, if so, the amount the insurer would pay for the claim.
Part C - Uninsured Motorists Coverage	Summarize each of the provisions in Part C—Uninsured Motorists Coverage of the Personal Auto Policy.
UM/UIM Endorsements and State Variations	Describe underinsured motorists coverage in terms of: <ul style="list-style-type: none"> • Its purpose • The ways in which it can vary by state
Part C - Uninsured Motorists Coverage Case	Given a case describing an uninsured motorists claim, determine whether Part C—Uninsured Motorists Coverage of the Personal Auto Policy would cover the claim and, if so, the amount the insurer would pay for the claim.

Assignment 5: Personal Auto Policy: Physical Damage, Duties After an Accident, Endorsements, General Provisions

MODULE TITLE	LEARNING OBJECTIVE
Part D - Damage to Your Auto Coverage	Summarize each of the provisions in Part D—Damage to Your Auto of the Personal Auto Policy.
Part D - Damage to Your Auto Coverage Case	Given a case describing an auto physical damage claim, determine whether Part D—Coverage for Damage to Your Auto of the Personal Auto Policy would cover the claim and, if so, the amount the insurer would pay for the claim.
Part E - Duties After an Accident or Loss	Identify the insured's duties following an auto accident or loss (Part E) covered by the Personal Auto Policy.
Part F - General Provisions	Summarize each of the general provisions in Part F of the Personal Auto Policy.
Common Endorsements to the Personal Auto Policy	Identify the Personal Auto Policy endorsements that are used to handle common auto loss exposures.
Personal Auto Coverage Case	Given a case describing an auto claim, determine whether the Personal Auto Policy would cover the claim and, if so, the amount the insurer would pay for the claim.

Assignment 6: Homeowners Property Coverage

MODULE TITLE	LEARNING OBJECTIVE
ISO Homeowners Program	Describe how individuals and families can use the ISO Homeowners insurance program to address their personal risk management needs.
Homeowners Program Structure	Summarize these aspects of the 2011 Homeowners Program: <ul style="list-style-type: none"> • Structure of the Homeowners Policy (HO-3) • Key changes in the ISO 2011 Program Revision • Factors important to rating homeowners insurance
HO-3 Section I - Property Coverages	Determine whether the 2011 HO-3 policy provisions in the following Section I - Property Coverages provide coverage for a given loss or loss exposure: <ul style="list-style-type: none"> • Coverage A - Dwelling • Coverage B - Other Structures • Coverage C - Personal Property • Coverage D - Loss of Use • Additional Coverages
HO-3 Section I - Perils Insured Against and Exclusions	Summarize each of the 2011 HO-3 policy provisions: <ul style="list-style-type: none"> • Perils Insured Against • Exclusions
HO-3 Section I - Conditions	Summarize each of the 2011 HO-3 policy provisions in Section I - Conditions.

2011 HO-3 Section I - Property Coverage Case	Given a scenario describing a homeowners property claim, determine whether the 2011 HO-3 Policy Section I - Property Coverages would cover the claim, and if so, the amount the insurer would pay for the claim.
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Assignment 7: Homeowners Liability, Conditions, Coverage Forms, and Endorsements

MODULE TITLE	LEARNING OBJECTIVE
HO-3 Section II - Liability Coverages	Determine whether the 2011 HO-3 Policy provisions in the following Section II - Liability Coverages provide coverage for a given loss or loss exposure: <ul style="list-style-type: none"> • Coverage E - Personal Liability • Coverage F - Medical Payments to Others • Additional Coverages
HO-3 Section II - Exclusions	Determine whether one or more exclusions preclude the coverage provided by Section II of the 2011 HO-3 policy provisions in Section II - Exclusions.
HO-3 Section II - Conditions	Summarize each of these 2011 HO-3 policy provisions: <ul style="list-style-type: none"> • Conditions applicable to Section II • Conditions applicable to Sections I and II
Homeowners Coverage Forms and Causes of Loss Comparison Summary to the HO-3	Compare the coverage provided by each of the following 2011 Homeowners policies to the coverage provided by the 2011 HO-3 policy: <ul style="list-style-type: none"> • HO-2 Broad Form • HO-5 Comprehensive Form • HO-4 Contents Broad Form • HO-6 Unit-Owners Form • HO-8 Modified Coverage Form
Commonly Used Endorsements that Modify the 2011 ISO Homeowners Policies	Summarize the coverages provided by various 2011 ISO Homeowners policy endorsements.
HO-3 Coverage Case	Given a case describing a homeowners claim, determine whether a 2011 HO-3 Policy that may include one or more endorsements would cover the claim, and, if so, the amount the insurer would pay for the claim.

Assignment 8: Commercial Property Insurance, Part I

MODULE TITLE	LEARNING OBJECTIVE
Overview of the Commercial Property Insurance	Describe commercial property insurance in terms of these elements: <ul style="list-style-type: none"> • The major categories of loss exposures that can be covered • The components of a commercial property coverage part

BPP Covered Property	Determine whether a described item of property qualifies as Covered Property under one or more of these categories in the Building and Personal Property Coverage Form: <ul style="list-style-type: none"> • Building • Your Business Personal Property • Personal Property of Others
BPP Additional Coverages and Coverage Extensions	Determine which of the additional coverages and coverage extensions of the Building and Personal Property Coverage Form apply to a described loss.
Causes of Loss—Basic Form and Broad Form	Determine whether the cause of a described loss is a covered cause of loss under either the Causes of Loss—Basic Form or the Causes of Loss—Broad Form.
Cause of Loss—Special Form	Determine whether the cause of a described loss is a Covered Cause of Loss under the Causes of Loss—Special Form.
BPP Limits of Insurance and Deductibles	Apply the Limits of Insurance and Deductible provisions of the Building and Personal Property Coverage Form to a described loss.

Assignment 9: Commercial Property Insurance, Part II

MODULE TITLE	LEARNING OBJECTIVE
BPP Loss Conditions and Additional Conditions	Explain how each of the Loss Conditions and Additional Conditions affects coverage under the Building and Personal Property Coverage Form.
BPP: Optional Coverages	Explain how each of the following optional coverages described in the BPP modifies the basic coverage of the BPP: <ul style="list-style-type: none"> • Agreed Value • Inflation Guard • Replacement Cost • Extension of Replacement Cost to Personal Property of Others
Commercial Property Conditions	Summarize each of the Commercial Property Conditions.
Common Policy Conditions	Explain how each of the conditions contained in the Common Policy Conditions affects coverage under a commercial property coverage part.
Commercial Property Endorsements	Explain how each of these documents modifies the Building and Personal Property Coverage Form: <ul style="list-style-type: none"> • Ordinance or Law Coverage endorsement • Spoilage Coverage endorsement • Flood Coverage endorsement • Earthquake and Volcanic Eruption Coverage endorsement • Peak Season Limit of Insurance endorsement • Value Reporting Form

Factors Affecting Commercial Property Premiums	Identify the factors that affect commercial property insurance premiums
Determining Whether the BPP Covers a Loss	Given a case, determine whether, and for what amount, a described loss would be covered by a commercial property coverage part that includes the Building and Personal Property Coverage Form and any of the three causes of loss forms.

Assignment 10: Commercial General Liability Insurance, Part I

MODULE TITLE	LEARNING OBJECTIVE
Overview of Commercial General Liability Insurance	Describe commercial general liability insurance in terms of these elements: <ul style="list-style-type: none"> The types of losses that can be covered by general liability insurance The components of a commercial general liability coverage part
CGL Coverage A—Insuring Agreement	Determine whether a described claim meets the conditions imposed by the Coverage A insuring agreement of the Commercial General Liability Coverage Form (occurrence version).
CGL Coverage A—Exclusions	Determine whether any of the exclusions applicable to Coverage A of the Commercial General Liability Coverage Form eliminate coverage for a described claim.
CGL Coverage B—Personal and Advertising Injury Liability	Determine whether a described claim meets the conditions imposed by the Coverage B insuring agreement of the Commercial General Liability Coverage Form and whether any of the Coverage B exclusions eliminate coverage for the claim.
CGL Coverage C—Medical Payments	Determine whether a described claim meets the conditions imposed by the Coverage C insuring agreement of the Commercial General Liability Coverage Form, and whether any of the Coverage C exclusions eliminate coverage for the claim.
CGL Supplementary Payments	Summarize the supplementary payments of the Commercial General Liability Coverage Form.

Assignment 11: Commercial General Liability Insurance, Part II

MODULE TITLE	LEARNING OBJECTIVE
CGL Who Is an Insured Provisions	Determine whether a described person organization is an insured under the Commercial General Liability Coverage Form.
CGL Limits of Insurance	Explain how the following limits of insurance in the CGL Coverage Form are applied: <ul style="list-style-type: none"> Each occurrence limit Personal and advertising injury limit Damage to premises rented to you limit Medical expense limit General aggregate limit Products-completed operations aggregate limit

CGL Conditions	Apply the Commercial General Liability Conditions to claims or other interactions between the insurer and the insured.
Rating CGL Coverage	Explain how the premium for CGL coverage is determined.
Determining Whether the CGL Covers a Claim Case	Given a case, determine whether, and for what amount, the Commercial General Liability Coverage Form (occurrence version) covers a described claim.

Assignment 12: Specialty Coverages

MODULE TITLE	LEARNING OBJECTIVE
Commercial Excess and Umbrella Liability Insurance	Describe commercial excess liability insurance and commercial umbrella liability insurance in terms of these characteristics: <ul style="list-style-type: none"> • The three basic types of commercial excess liability insurance • The provisions commonly found in commercial umbrella liability policies that distinguish them from other types of commercial liability policies
Professional Liability and Management Liability Insurance	Describe professional liability insurance and management liability insurance in terms of these aspects: <ul style="list-style-type: none"> • How they differ from each other • How they differ from commercial general liability policies • The common types of professional and management liability policies
Environmental Insurance	Describe the purpose and characteristics of each of these types of environmental insurance policies: <ul style="list-style-type: none"> • Site-specific environmental impairment liability (EIL) policies • Underground storage tank compliance policies • Remediation stop-loss policies • Contractors pollution liability policies • Environmental professional errors and omissions liability policies
Aircraft Insurance	Describe aircraft insurance in terms of these characteristics: <ul style="list-style-type: none"> • The purposes-of-use categories that insurers used to classify aircraft • The coverages that can be included in an aircraft policy
Cyber Risk Insurance	Describe the types of losses that can be covered by each of the insuring agreements generally available in cyber risk insurance policies.
Insuring Foreign Operations	Explain how an organization domiciled in the United States can insure foreign loss exposures that would not be covered under standard property and liability insurance policies.

Terrorism Endorsements for Commercial Property and Liability Forms	Summarize the purpose and provisions of the terrorism endorsements developed by Insurance Services Office, Inc., and the National Council on Compensation Insurance, Inc.
Types of Surety Bonds	Summarize the guarantee provided by the particular types of surety bonds within the following bond classifications: <ul style="list-style-type: none"> • Contract bonds • License and permit bonds • Public official bonds • Court bonds • Miscellaneous bonds

Assignment 13: Insurance Law, Part I

MODULE TITLE	LEARNING OBJECTIVE
Tort Law	Explain these concepts: <ul style="list-style-type: none"> • Tort as distinguished from other offenses • Classifications of tort • Application of laws in tort cases
Negligence	Describe negligence claims in terms of: <ul style="list-style-type: none"> • The elements of negligence • The required proof of negligence
Defenses Against Negligence Claims	Describe these defenses against negligence claims: Comparative negligence, releases and exculpatory clauses, immunity, statutes of limitations and repose, tortfeasor's capacity.
Liability of Landowners or Occupiers of Land	Explain how negligence applies to landowners or occupiers of land.
Intentional Torts Part 1 of 2	Describe these intentional torts, the circumstances under which they can occur, and common defenses to them: <ul style="list-style-type: none"> • Battery • Assault • False imprisonment and false arrest • Intentional infliction of emotional distress • Defamation (libel and slander) • Invasion of the right of privacy
Intentional Torts Part 2 of 2	Describe these intentional torts, the circumstances under which they can occur, and common defenses to them: <ul style="list-style-type: none"> • Fraud • Bad faith, or outrage • Interference with relationships between others • Misuse of legal process • Trespass • Nuisance • Conversion

Liability in Extraordinary Circumstances	<p>Explain how liability attaches as a result of the unique circumstances presented by the following:</p> <ul style="list-style-type: none"> • Ultrahazardous activities • Ownership and/or possession of animals • Escape of toxic substances
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Assignment 14: Insurance Law, Part II

MODULE TITLE	LEARNING OBJECTIVE
Products Liability	<p>Describe these causes of action for products liability and the possible defenses to them:</p> <ul style="list-style-type: none"> • Misrepresentation • Breach of warranty • Strict liability and negligence
Professional Liability	Describe professional and directors and officers liability.
Damages in Tort Suits	Describe the types of damages a court can award a plaintiff for a tort claim.
Equitable Remedies	<p>Explain these equitable remedies:</p> <ul style="list-style-type: none"> • Specific performance • Injunction
Factors Affecting Amounts and Payment of Damages	<p>Summarize these legal concepts related to negligence damages and remedies:</p> <ul style="list-style-type: none"> • <i>Restitutio in integrum</i> • Mitigation of damages • Aggravated damages • Structured settlements and judgments
Liability Concepts Affecting Tort Claims	<p>Explain how any of these concepts can affect a tort claim:</p> <ul style="list-style-type: none"> • Joint tortfeasor's liability • Expanded liability concepts • Vicarious liability • Good Samaritan issues • Class actions
Trends in Tort Litigation	<p>Summarize these trends in tort litigation:</p> <ul style="list-style-type: none"> • Class action litigation • Litigation funding • Punitive damages • Tort reform

Assignment 15: Insurance Regulation

MODULE TITLE	LEARNING OBJECTIVE
Economic Impact of the Insurance Industry	Explain the economic impact of the insurance industry.
The Objectives of Insurance Regulation	Describe the objectives of insurance regulation.

The Sources of Insurance Regulation	Describe the three sources from which insurance regulatory powers originate: <ul style="list-style-type: none"> • Legislation • Judicial review • Administrative agencies
The Structure of Insurance Regulations	Describe the structure of insurance regulations.
Elements of Rate Regulation and Ratemaking	Describe the following elements of rate regulation and ratemaking: <ul style="list-style-type: none"> • Purpose and unique qualities of the insurance industry • Actuarial ratemaking principles and considerations in rate regulation • Insurance advisory organizations
Types of Rate Regulations	Compare the following types of rate regulation: <ul style="list-style-type: none"> • Prior approval • File and use • Use and file • Open competition • Flex rating • Government-mandated rates
Effects of Rate Regulation on Insurers	Summarize the effects of rate regulation on these aspects of insurance: <ul style="list-style-type: none"> • Resources required for complying with rate regulations • The underwriting cycle • Insurers' decision making regarding where to operate

Study Materials for CAS Online Course 2

The online course itself contains learning objectives and all the educational material to meet these objectives and successfully complete the exam. The course fee includes one attempt at the exam.

The following printed materials are supplemental and may also be purchased from The Institutes, but are not required:

- **Textbook** contains material that is identical to the online course—only in a hardcopy format.
- **Review Notes** is a condensed version of the textbook.
- **Course Guide** contains sample questions and answers.
- **Flashcards** contain key words and phrases.

The materials described above may be purchased individually or in various package combinations.

Questions about potentially defective questions or material should be directed to The Institutes' Customer Service Department at (800) 644-2101 or (610) 644-2100, extension 6000, or CustomerService@TheInstitutes.org.

Publisher and Distributor

CAS Online Course 2/CA2, 2nd Edition is available through The Institutes.

The Institutes, 720 Providence Road, Suite 100, Malvern, PA 19355-3433; telephone: (800) 644-2101 or (610) 644-2100 extension 6000; e-mail: CustomerService@TheInstitutes.org; Web page for CAS Online Courses: www.aicpcu.org/cas.htm.

Exam Results

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November 2012 Exam 3L Syllabus Models for Life Contingencies and Statistics

The syllabus for this two-and-a-half-hour exam is defined in the form of learning objectives, knowledge statements, and readings.

LEARNING OBJECTIVES set forth, usually in broad terms, what the candidate should be able to do in actual practice. Included in these learning objectives are certain methodologies that may not be possible to perform on an examination, such as complex simulations, but that the candidate would still be expected to explain conceptually in the context of an examination.

KNOWLEDGE STATEMENTS identify some of the key terms, concepts, and methods that are associated with each learning objective. These knowledge statements are not intended to represent an exhaustive list of topics that may be tested, but they are illustrative of the scope of each learning objective.

READINGS support the learning objectives. It is intended that the readings, in conjunction with the material on the lower numbered examinations, provide sufficient resources to allow the candidate to perform the learning objectives. Some readings are cited for more than one learning objective. The Syllabus and Examination Committees emphasize that candidates are expected to use the readings cited in this *Syllabus* as their primary study materials.

Thus, the learning objectives, knowledge statements, and readings complement each other. The learning objectives define the behaviors, the knowledge statements illustrate more fully the intended scope of the learning objectives, and the readings provide the source material to achieve the learning objectives. Learning objectives should not be seen as independent units, but as building blocks for the understanding and integration of important competencies that the candidate will be able to demonstrate.

Note that the range of weights shown should be viewed as a guideline only. There is no intent that they be strictly adhered to on any given examination—the actual weight may fall outside the published range on any particular examination.

The overall section weights should be viewed as having more significance than the weights for the individual learning objectives. Over a number of years of examinations, absent changes, it is likely that the average of the weights for each individual overall section will be in the vicinity of the guideline weight. For the weights of individual learning objectives, such convergence is less likely. On a given examination, in which it is very possible that not every individual learning objective will be tested, there will be more divergence of guideline weights and actual weights. Questions on a given learning objective may be drawn from any of the listed readings, or a combination of the readings. There may be no questions from one or more readings on a particular exam.

After each set of learning objectives, the readings are listed in abbreviated form. Complete text references are provided at the end of this exam syllabus.

Items marked with a bold **OP** (Online Publication) are available at no charge and may be downloaded from links in the Complete Text References section below. Books and other publications marked with a bold **B** may be purchased from the publisher or a bookstore (with limited copies available to be borrowed from the CAS Library). Items marked with a bold **BO** are optional books that may be purchased from the publisher or bookstore.

Please check the “Syllabus Update” for this exam for any changes to this syllabus.

The CAS will grant credit for CAS Exam 3L to those who successfully complete SOA Exam MLC (Models for Life Contingencies) in the current education structure.

A thorough knowledge of calculus, probability, and interest theory is assumed. Knowledge of risk management at the level of Exam 1/P is also assumed.

This examination develops the candidate’s knowledge of the theoretical basis of contingent payment models and the application of those models to insurance risks.

The candidate will be required to develop an understanding of contingent payment models. The candidate will be expected to understand what important results can be obtained from these models for the purpose of making business decisions, and what approaches can be used to determine these results.

A [variety of tables](#) will be provided to the candidate with the exam. The tables include values for the standard normal distribution, illustrative life tables, abridged inventories of discrete and continuous probability distributions, Chi-square Distribution, t -Distribution, and F -Distribution. Since they will be included with the examination, candidates will not be allowed to bring copies of the tables into the examination room.

The CAS will test the candidate’s knowledge of topics that are presented in the learning objectives. Thus, the candidate should expect that each exam will cover a large proportion of the learning objectives and associated knowledge statements and syllabus readings, and that all of these will be tested at least once over the course of a few years—but each one may not be covered on each exam

A guessing adjustment will be used in grading Exam 3L. Details are provided under “Guessing Adjustment” in the “Rules-The Examination” section.

A. Survival Models

Range of weight for Section A: 33-37 percent

Candidates should be able to work with discrete and continuous univariate probability distributions for failure time random variables. They will be expected to set up and solve equations in terms of life table functions, cumulative distribution functions, survival functions, probability density functions, and hazard functions (e.g., force of mortality), as appropriate. They should have similar facility with models of the joint distribution of two failure times (multiple lives) and the joint distribution of competing risks (multiple decrement).

Candidates should be able to use Markov Chains in order to determine state probabilities and transition probabilities.

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
<p>1. For discrete and continuous univariate probability distributions for failure time random variables, develop expressions in terms of the life table functions, l_x, q_x, p_x, ${}_nq_x$, ${}_np_x$, and ${}_{\min}q_x$, for the cumulative distribution function, the survival function, the probability density function and the hazard function (force of mortality), and be able to:</p> <ul style="list-style-type: none"> • Establish relations between the different functions • Develop expressions, including recursion relations, in terms of the functions for probabilities and moments associated with functions of failure time random variables, and calculate such quantities using simple failure time distributions <p>The distributions may be left-truncated, right-censored, both, or neither.</p> <p>Range of weight: 5-10 percent</p>	<p>a. Failure time random variables b. Life table functions c. Cumulative distribution functions d. Survival functions e. Probability density functions f. Hazard functions g. Relationships between failure time random variables in the functions above</p>
READINGS	
Cunningham et al., Chapters 5.1-5.4 and 6.1-6.4 (Third Edition: Chapters 3.1-3.4 and 4.1-4.4)	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
2. Assuming a uniform distribution of deaths, define the continuous survival time random variable that arises from the discrete survival time random variable. Range of weight: 3-7 percent	a. Life table function forms under uniform distribution of deaths assumption
READINGS	
Cunningham et al., Chapter 6.6 (Third Edition: Chapter 4.5)	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
3. Given the joint distribution of two failure times: <ul style="list-style-type: none"> • Calculate probabilities and moments associated with functions of these random variables' variances. • Characterize the distribution of the smaller failure time (the joint life status) and the larger failure time (the last survivor status) in terms of functions analogous to those in the Learning Objective 1 above, as appropriate. • Develop expressions, including recursion relations, for probabilities and moments of functions of the joint life status and the last survivor status, and express these in terms of the univariate functions in Learning Objective 1 above (assuming independence of the two failure times). Range of weight: 5-10 percent	a. Joint distribution of failure times b. Probabilities and moments
READINGS	
Cunningham et al., Chapters 12.1-12.2 and 12.6 (Third Edition: Chapters 9.1-9.2 and 9.5)	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
4. Based on the joint distribution (pdf and cdf) of the time until failure and the cause of failure in the competing risk (multiple decrement) model and in terms of the functions $l_x^{(i)}$, ${}_tq_x^{(i)}$, ${}_tp_x^{(i)}$, ${}_td_x^{(i)}$: <ul style="list-style-type: none"> • Establish relations between the functions. • Calculate probabilities and moments associated with functions of these random variables, given the joint distribution of the time of failure and the cause of failure. Range of weight: 5-10 percent	a. Time until failure b. Competing risk (multiple decrement) models
READINGS	
Cunningham et al., Chapters 13.1-13.3 (Third Edition: Chapters 10.1-10.3)	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
5. For homogenous and non-homogenous discrete-time Markov chain models: <ul style="list-style-type: none"> • Define each model. • Calculate probabilities of being in a particular state at a particular time. • Calculate probabilities of transitioning between states. Range of weight: 5-10 percent	a. Markov chains b. Transition probability matrix c. Discrete-time Markov chains
READINGS	
Daniel Markov, Chapters 1 and 3	

B. Stochastic Processes

Range of weight for Section B: 5-10 percent

Candidates should be able to solve problems using stochastic processes. They should be able to determine the probabilities and distributions associated with these processes. Specifically, candidates should be able to use a Poisson process in these applications.

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
1. Describe the properties of Poisson processes: <ul style="list-style-type: none"> • For increments in the homogeneous case • For interval times in the homogeneous case • For increments in the non-homogeneous case • Resulting from special types of events in the Poisson process • Resulting from sums of independent Poisson processes Range of weight: 0-5 percent	a. Poisson process b. Non-homogeneous Poisson process
2. For any Poisson process and the interarrival and waiting distributions associated with the Poisson process, calculate: <ul style="list-style-type: none"> • Expected values • Variances • Probabilities Range of weight: 0-5 percent	a. Probability calculations for Poisson process
3. For a compound Poisson process, calculate moments associated with the value of the process at a given time. Range of weight: 0-5 percent	a. Compound Poisson process
READINGS	
Daniel Poisson	

C. Life Contingency Models

Range of weight for Section C: 23-27 percent

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
<p>1. Apply a principle to a present value model to associate a cost or pattern of costs (possibly contingent) with a set of future contingent cash flows.</p> <p>Range of weight: 10-15 percent</p>	<p>a. Principles include: equivalence, exponential, standard deviation, variance, and percentile</p> <p>b. Models including those listed in Learning Objectives A2-A4 (survival models).</p> <p>c. Principle applications include: life insurance, annuities, health care, credit risk, environmental risk, consumer behavior (e.g., subscriptions), and warranties</p>
READINGS	
Cunningham et al., Chapters 7.1-7.4, 8.1-8.3, 9.1-9.2, 9.4, and 12.4.1-12.4.4 (Third Edition: Chapters 5.1-5.4, 6.1-6.3, 7.1-7.3, and 9.4.1-9.4.4)	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
<p>2. Analyze present value of future loss random variables for life insurances and annuities and determine net liabilities using prospective and retrospective methods.</p> <p>Range of weight: 5-10 percent</p>	<p>a. Life insurance liability calculations</p> <p>b. Prospective and retrospective methods</p>
READINGS	
Cunningham et al., Chapters 10.1 and 10.3 (Third Edition: Chapters 8.1 and 8.3)	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
<p>3. Using present-value-of-benefit random variables and present-value-of-future-loss random variables extended to discrete time Markov chains, calculate:</p> <ul style="list-style-type: none"> • Actuarial present values of cash flows at transitions between states • Actuarial present values of cash flows while in a state • Considerations (premiums) using the Equivalence Principle • Liabilities (reserves) using the prospective method <p>Range of weight: 3-7 percent</p>	<p>a. Cash flows at transition</p> <p>b. Triple product summation</p> <p>c. Transition probabilities</p>
READINGS	
Daniel Markov, Chapters 2 and 3	

D. Statistics

Range of weight for Section D: 33-37 percent

Candidates should be able to apply statistical theory to solve business problems.

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
<p>1. Perform point estimation of statistical parameters using the following statistical methods:</p> <ul style="list-style-type: none"> • Maximum likelihood estimation (“MLE”) • Method of moments <p>Apply criteria to the estimates such as:</p> <ul style="list-style-type: none"> • Consistency • Unbiasedness • Minimum variance • Mean square error <p>Range of weight: 10-15 percent</p>	<ul style="list-style-type: none"> a. Equations for MLE of mean, variance from a sample b. Estimation of mean and variance based on sample c. General equations for MLE of parameters d. Equations for estimation of parameters using method of moments for means, variances, and higher moments e. Recognition of consistency property of estimators and alternative measures of consistency f. Application of criteria for measurement when estimating parameters through minimization of variance, mean square error g. Definition of statistical bias and recognition of estimators that are unbiased or biased
<p>2. Test statistical hypotheses including Type I and Type II errors using:</p> <ul style="list-style-type: none"> • Neyman-Pearson lemma • Likelihood ratio tests <p>Apply Neyman-Pearson lemma to construct likelihood ratio equation.</p> <p>Range of weight: 10-15 percent</p>	<ul style="list-style-type: none"> a. Presentation of fundamental inequalities based on general assumptions and normal assumptions b. Definition of Type I and Type II errors c. Significance levels d. One-sided versus two-sided tests e. Estimation of sample sizes under normality to control for Type I and Type II errors f. Determination of critical regions g. Definition and measurement of likelihood ratio tests h. Determining parameters and testing using tabular values i. Recognizing when to apply likelihood ratio tests versus chi-square or other goodness of fit tests
<p>3. Calculate order statistics of a sample and use critical values from a sampling distribution to test means and variances.</p> <p>Range of weight: 3-7 percent</p>	<ul style="list-style-type: none"> a. General form for distribution of n^{th} largest element of a set b. Application to a given distributional form c. Recognition of random variables from sample that behave as t-stat or F-stat d. Determination of parameters when applying these tests and obtaining tabular values e. Presentation of hypotheses testing from above for mean and variances
<p>4. Perform a linear regression using the least squares method.</p> <p>Range of weight: 3-7 percent</p>	<ul style="list-style-type: none"> a. Presentation and calculation of equations for regression statistics

READINGS

There is no single required text for Section D. The texts listed below may be considered as representative of the many texts available to cover the material on which the candidate may be examined based on the learning objectives and knowledge statements:

Asimow and Maxwell
 Hogg and Tanis
 Hogg et al.
 Larsen and Marx

Complete Text References for Exam 3L

Text references are alphabetized by the citation column.

Citation	Abbreviation	Learning Objectives	Source
Asimow, L.A.; and Maxwell, M.A., <i>Probability and Statistics with Applications: A Problem Solving Text</i> , 2010, ACTEX Publications, Inc.	Asimow and Maxwell	D1-D4	BO
Cunningham, R.; Herzog, T.; and London, R., <i>Models for Quantifying Risk</i> (Fourth Edition), 2011, ACTEX Publications, Chapters 5.1-5.4, 6.1-6.4, 6.6, 7.1-7.4, 8.1-8.3, 9.1-9.2, 9.4, 10.1, 10.3, 12.1-12.2, 12.4.1-12.4.4, 12.6, and 13.1-13.3. Candidates are not responsible for formulae 6.51 through 6.55 nor are they responsible for the “Hyperbolic (Balducci)” column of Table 6.3. [Candidates may also use the Third Edition: Chapters 3.1-3.4, 4.1-4.4, 4.5, 5.1-5.4, 6.1-6.3, 7.1-7.3, 8.1, 8.3, 9.1-9.2, 9.4.1-9.4.4, 9.5, and 10.1-10.3. Candidates are not responsible for formulae 4.62 through 4.65 nor are they responsible for the “Hyperbolic (Balducci)” column of Table 4.3.]	Cunningham et al.	A1-A4, C1, C2	B
Daniel, J.W., “Multi-state Transition Models with Actuarial Applications.” Study Note, 2004 (second printing with minor corrections, October 2007).	Daniel Markov	A5, C3	OP
Daniel, J.W., “Poisson processes (and mixture distributions),” Study Note, June 2008.	Daniel Poisson	B1-B3	OP
Hogg, R.V.; McKean, J.W.; and Craig, A.T., <i>Introduction to Mathematical Statistics</i> (Sixth Edition), 2004, Prentice Hall.	Hogg et al.	D1-D4	BO
Hogg, R.V.; and Tanis, E., <i>Probability and Statistical Inference</i> (Eighth Edition), 2010, Prentice Hall.	Hogg and Tanis	D1-D4	BO
Larsen, R.J.; and Marx, M.L., <i>An Introduction to Mathematical Statistics and Its Applications</i> (Fifth Edition), 2012, Pearson Education, Inc.	Larsen and Marx	D1-D4	BO

Source Key

- B** Book—may be purchased from the publisher or bookstore or borrowed from the CAS Library.
- BO** Book (Optional)—may be purchased from the publisher or bookstore.
- OP** Online publication—available at no charge and is linked from the text references section above.

Publishers and Distributors for Exam 3L

Contact information is furnished for those who wish to purchase the text references cited for Exam 3L. Publishers and distributors are independent and listed for the convenience of candidates; inclusion does not constitute endorsement by the CAS.

ACTEX Publications, 107 Groppo Drive, Suite A, P.O. Box 974, Winsted, CT 06098; telephone: (800) 282-2839 or (860) 379-5470; fax: (860) 738-3152; e-mail: retail@actexamdriver.com; Web site: www.actexamdriver.com.

Actuarial Bookstore, P.O. Box 69, Greenland, NH 03840; telephone: (800) 582-9672 (U.S. only) or (603) 430-1252; fax: (603) 430-1258; Web site: www.actuarialbookstore.com.

Asimow, L.A.; and Maxwell, M.A., *Probability and Statistics with Applications: A Problem Solving Text*, 2010, ACTEX Publications, Inc., 140 Willow Street, Suite One, P.O. Box 974, Winsted, CT 06098; telephone: (800) 282-2839 or (860) 379-5470; fax: (860) 738-3152; Web site: www.actexamdriver.com; e-mail: retail@actexamdriver.com.

Cunningham, R.; Herzog, T.; and London, R., *Models for Quantifying Risk* (Fourth Edition), 2011, ACTEX Publications, Inc., 140 Willow Street, Suite One, P.O. Box 974, Winsted, CT 06098; telephone: (800) 282-2839 or (860) 379-5470; fax: (860) 738-3152; Web site: www.actexamdriver.com; e-mail: retail@actexamdriver.com.

Hogg, R.V.; Craig, A.T.; and McKean, J.W., *Introduction to Mathematical Statistics* (Sixth Edition), 2004, Prentice Hall, Inc., 200 Old Tappan Road, Old Tappan, NJ 07675; telephone: (800) 282-0693; Web site: www.pearsonhighered.com.

Hogg, R.V.; and Tanis, E., *Probability and Statistical Inference* (Eighth Edition), 2010, Prentice Hall, Inc., 200 Old Tappan Road, Old Tappan, NJ 07675; telephone: (800) 282-0693; Web site: www.pearsonhighered.com.

Larsen, R.J.; and Marx, M.L., *An Introduction to Mathematical Statistics and Its Applications* (Fifth Edition), 2012, Pearson Education, Inc., 200 Old Tappan Road, Old Tappan, NJ 07675; telephone: (800) 282-0693; Web site: www.pearsonhighered.com.

Mad River Books (A division of ACTEX Publications), 140 Willow Street, Suite One, P.O. Box 974, Winsted, CT 06098; telephone: (800) 282-2839 or (860) 379-5470; fax: (860) 738-3152; e-mail: retail@actexamdriver.com.

SlideRule Books, P.O. Box 69, Greenland, NH 03840; telephone: (877) 407-5433 or (603) 373-6140; fax: (877) 417-5433 or (603) 430-1258; Web site: www.sliderulebooks.com.

2012 Exam 5

Basic Techniques for Ratemaking and Estimating Claim Liabilities

The syllabus for this four-hour exam is defined in the form of learning objectives, knowledge statements, and readings.

LEARNING OBJECTIVES set forth, usually in broad terms, what the candidate should be able to do in actual practice. Included in these learning objectives are certain methodologies that may not be possible to perform on an examination, such as complex simulations, but that the candidate would still be expected to explain conceptually in the context of an examination.

KNOWLEDGE STATEMENTS identify some of the key terms, concepts, and methods that are associated with each learning objective. These knowledge statements are not intended to represent an exhaustive list of topics that may be tested, but they are illustrative of the scope of each learning objective.

READINGS support the learning objectives. It is intended that the readings, in conjunction with the material on the lower numbered examinations, provide sufficient resources to allow the candidate to perform the learning objectives. Some readings are cited for more than one learning objective. The Syllabus and Examination Committees emphasize that candidates are expected to use the readings cited in this *Syllabus* as their primary study materials.

Thus, the learning objectives, knowledge statements, and readings complement each other. The learning objectives define the behaviors, the knowledge statements illustrate more fully the intended scope of the learning objectives, and the readings provide the source material to achieve the learning objectives. Learning objectives should not be seen as independent units, but as building blocks for the understanding and integration of important competencies that the candidate will be able to demonstrate.

Note that the range of weights shown should be viewed as a guideline only. There is no intent that they be strictly adhered to on any given examination—the actual weight may fall outside the published range on any particular examination.

The overall section weights should be viewed as having more significance than the weights for the individual learning objectives. Over a number of years of examinations, absent changes, it is likely that the average of the weights for each individual overall section will be in the vicinity of the guideline weight. For the weights of individual learning objectives, such convergence is less likely. On a given examination, in which it is very possible that not every individual learning objective will be tested, there will be more divergence of guideline weights and actual weights. Questions on a given learning objective may be drawn from any of the listed readings, or a combination of the readings. There may be no questions from one or more readings on a particular exam.

After each set of learning objectives, the readings are listed in abbreviated form. Complete text references are provided at the end of this exam syllabus.

Items marked with a bold **SK** constitute the 2012 CAS Exam 5 Study Kit that may be purchased from the CAS Online Store. Items marked with a bold **OP** (Online Publication) are available at no charge and may be downloaded from links in the Complete Text References section below.

Please check the “*Syllabus Updates*” section of the CAS Website for any changes to the *Syllabus*.

For information on half exams that are part of the 2011 Exam 5 transition rules, please see the following sections of this *Syllabus*: “Announcements for 2012” or “Transition Programs.”

A. Basic Techniques for Ratemaking

Range of weight for Section A: 50-60 percent

This section introduces the general principles of ratemaking as well as specific details regarding data requirements, calculations, key assumptions, and implementation-related issues. Candidates require a thorough understanding of basic ratemaking so that they will be able to analyze data, select appropriate techniques, and develop solutions to problems. This section addresses the advantages and disadvantages of the various ratemaking techniques as they are applied to specific situations and different lines of business. Classification of insureds for the purpose of risk stratification and other important ratemaking topics, such as coinsurance and catastrophe provisions, are also examined in this section.

Candidates are also expected to be knowledgeable in the calculation of policy premiums using manual rate pages. Excerpts from the ISO Personal Automobile Manual will be provided with the examination. Candidates are not required to memorize the details, but will be expected to be able to use them during the examination. Since they will be included with the examination, candidates will not be allowed to bring copies of the documents into the examination room.

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
1. Calculate a policy premium for a specified risk using the rate pages provided. Range of weight: 0-3 percent	a. How to read and use manual rate pages
READINGS	
ISO PAM Werner & Modlin, Chapter 2	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
2. Describe, analyze, or design the information requirements for ratemaking related to exposures and demonstrate the use of exposures in ratemaking. Range of weight: 2-6 percent	a. Definition of exposure base b. Characteristics of exposure bases c. Relationship of exposures to coverage provisions d. Organization of data: calendar year, policy year, accident year e. Written exposure versus earned exposure versus in-force exposure f. Role of exposures in the ratemaking process g. Influence of changes in exposures
READINGS	
Werner & Modlin, Chapters 1- 4	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
<p>3. Describe, analyze, or design the information requirements for ratemaking related to premiums and demonstrate the use of premiums in ratemaking.</p> <p>Range of weight: 4-8 percent</p>	<p>a. Organization of data: calendar year, policy year, accident year</p> <p>b. Written premium versus earned premium versus in-force premium</p> <p>c. Relationship between earned premium and earned exposure</p> <p>d. Policy terms</p> <p>e. Effect of law changes</p> <p>f. Effect of rate changes</p> <p>g. Determinations of and application of premium trend</p> <p>h. Adjustment for coverage and benefit level changes</p> <p>i. Distributional shifts and changes in volume (i.e., trend over time)</p> <p>j. Parallelogram method</p> <p>k. Extension of exposures</p>
READINGS	
<p>ASOP 13 Werner & Modlin, Chapters 1-3, 5, and Appendices A-D</p>	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
<p>4. Describe, analyze, or design the information requirements for ratemaking related to loss and loss adjustment expenses and demonstrate the use of loss and loss adjustment expenses in ratemaking.</p> <p>Range of weight: 8-12 percent</p>	<p>a. Organization of the data: calendar year, policy year, accident year, report year</p> <p>b. Policy provisions</p> <p>c. Occurrence coverage</p> <p>d. Claims-made coverage:</p> <ul style="list-style-type: none"> • report lag • coverage triggers • principles of claims-made policies • retroactive date • tail coverage <p>e. Reported losses versus paid losses</p> <p>f. Claim counts</p> <p>g. Loss adjustment expense (allocated and unallocated expenses)</p> <p>h. Loss development</p> <p>i. Frequency trend</p> <p>j. Severity trend</p> <p>k. Pure premium trend</p> <p>l. Approaches to determining trend (e.g., exponential and linear analyses)</p> <p>m. Relationship between trend and loss development</p> <p>n. Effect of law changes</p> <p>o. Effect of changes in mix of business</p> <p>p. Adjustment for coverage and benefit level changes</p> <p>q. Credibility criteria and formulae</p> <p>r. Large loss adjustment</p>

	<ul style="list-style-type: none"> s. Reinsurance recoveries t. Reinsurance costs u. Catastrophe adjustment
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READINGS

ASOP 13
Werner & Modlin, Chapters 1, 3, 6, 12, 16, and Appendices A-D

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
5. Calculate the underwriting expense provisions underlying the overall rate level indication. Range of weight: 0-5 percent	<ul style="list-style-type: none"> a. Expense categories (e.g., commission, general, other acquisition, taxes, licenses, and fees) b. Sources of data and selection criteria c. Profit and contingency provisions d. Net cost of reinsurance e. Cost of capital f. Fixed expenses and variable expenses g. Differences in procedures for loss adjustment expenses versus underwriting expenses

READINGS

Werner & Modlin, Chapters 1, 7, and Appendices A-D

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
6. Calculate the overall rate level indication using the pure premium and loss ratio methods and argue the merits of each. Range of weight: 3-6 percent	<ul style="list-style-type: none"> a. Statement of Principles, CAS b. Assumptions of each method c. Mechanics associated with each method (including organization of the data) d. When each method works and when it does not

READINGS

CAS Principles
Werner & Modlin, Chapters 1, 8, and Appendices A-D

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
7. Describe, analyze, and validate the considerations beyond the calculated cost-based estimate of the rate when selecting a final rate change to implement. Range of weight: 0-5 percent	<ul style="list-style-type: none"> a. Calculated cost-based rate b. Regulatory constraints c. Operational constraints d. Marketing constraints: <ul style="list-style-type: none"> • Competitive comparisons • Close ratios • Retention ratios • Growth • Distributional analysis • Policyholder dislocation analysis e. Lifetime value analysis f. Optimized pricing g. Underwriting cycles

READINGS

Werner & Modlin, Chapter 13

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
8. Explain the purpose for segregating data into homogeneous groups and summarize the considerations for determining such groups. Range of weight: 0-5 percent	a. Risk Classification Statement of Principles, AAA b. Criteria for selection of classification grouping c. Credibility d. Adverse Selection e. Efficiency of class plan
READINGS	
AAA Werner & Modlin, Chapter 9	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
9. Develop rating differentials for classification and territory and relativities for deductibles and increased limits. Range of weight: 8-12 percent	a. Formulae and process for each rating differential or relativity b. Credibility and complements of credibility c. Off balance d. Capping of change e. Loss elimination f. Basic limits versus total limits g. Layers of loss h. Expense adjustments i. Fundamentals of univariate and multivariate relativity analyses
READINGS	
Feldblum Werner & Modlin, Chapters 9-12, 15 and Appendices E-F	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
10. Assess the considerations for implementing rates to achieve an organization's goals. Range of weight: 0-3 percent	a. Rating algorithms b. Rating variables and differentials c. Fixed expenses, if applicable d. Expense fee calculation e. Calculation of final base rates f. Minimum premiums g. Non-pricing solutions
READINGS	
Werner & Modlin, Chapter 14	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
11. Calculate premium for policies with coinsurance provisions. Range of weight: 0-5 percent	a. Definition of coinsurance b. Insurance to value c. Common policy provisions d. Layers of loss e. Coverage issues f. Guaranteed replacement cost g. Formula
READINGS	
Werner & Modlin, Chapter 11	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
12. Perform basic individual risk rating calculations. Range of weight: 0-5 percent	<ul style="list-style-type: none"> a. Purpose of individual risk rating b. Schedule rating c. Manual rating d. Retrospective rating e. Experience modification f. Composite loss-rated risks g. Formulae h. Experience period i. Credibility j. Layers of loss
READINGS	
Werner & Modlin, Chapter 15	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
13. Develop estimated costs using the asset share and cash flow techniques. Range of weight: 0-5 percent	<ul style="list-style-type: none"> a. Model characteristics and formulae b. Premium c. Loss characteristics (i.e., frequency, severity) d. Expenses e. Persistency rates f. Policy durations g. Termination rates
READINGS	
Feldblum	

B. Estimating Claim Liabilities

Range of weight for Section B: 40-50 percent

This section explores basic techniques that actuaries use to estimate unpaid claims for both insurance entities and also for non-insurance entities that retain risk. The CAS Principles and the American Academy of Actuaries' Standards of Practice related to the estimation of unpaid claims are also examined in this section.

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
1. Describe, analyze, and validate the information requirements for estimating unpaid claims. Range of weight: 2-6 percent	<ul style="list-style-type: none"> a. Types of data and their sources b. Role of homogeneity and credibility of data in the process of estimating unpaid claims c. Fundamentals of different types of insurance (e.g., long tail versus short tail lines of business, low frequency versus high frequency lines) d. Organization of data: calendar year, accident year, policy year, underwriting year, report year e. Insurer's environment f. Importance of accurate estimates of unpaid claims
READINGS	
Friedland, Chapters 1, 3, and 4, and Appendices A and B	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
<p>2. Build and analyze claim development triangles.</p> <p>Range of weight: 2-6 percent</p>	<p>a. Purposes of the development triangle</p> <p>b. Development triangle as a diagnostic tool</p> <p>c. Examples and uses of diagnostic development triangles:</p> <ul style="list-style-type: none"> • Claim and claim count • Ratio of premium to claims • Average values • Ratios of claims and counts
READINGS	
Friedland, Chapters 5 and 6	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
<p>3. Construct and appraise unpaid claims estimates using each of the following estimation techniques:</p> <ul style="list-style-type: none"> • Development technique, including case outstanding technique • Expected claim technique • Bornhuetter-Ferguson technique • Cape Cod technique • Frequency-Severity techniques <p>Range of weight: 12-16 percent</p>	<p>a. Standards of Practice, ASOP 43</p> <p>b. Statement of Principles, CAS</p> <p>c. The claim process</p> <p>d. Assumptions of each estimation technique</p> <p>e. Mechanics associated with each technique (including organization of the data)</p> <p>f. Reporting and payment patterns</p> <p>g. When each techniques works and when it does not</p> <p>h. Key terms: case outstanding, paid claims, reported claims, incurred but not reported, ultimate claims, claims related expenses, reported and closed claim counts, claim counts closed with no payment, insurance recoverables, exposures, experience period, maturity or age, and components of unpaid claim estimates</p>
READINGS	
Friedland, Chapters 1-12, 15, and Appendices A-B	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
<p>4. Assess the influence of operating changes on the estimation of unpaid claims.</p> <p>Range of weight: 0-5 percent</p>	<p>a. How internal operating changes affect estimates of unpaid claims:</p> <ul style="list-style-type: none"> • Claims processing • Underwriting and policy provisions • Marketing • Coding of claim counts and/or claim related expenses • Treatment of recoveries such as policyholder deductibles and salvage and subrogation • Reinsurance
READINGS	
Friedland, Part 3 (Chapters 6-15)	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
5. Adjust data and/or estimation techniques for changes in the: <ul style="list-style-type: none"> • Internal environment (e.g., claims processes that result in shift in the adequacy of case outstanding or shift in settlement rates, change in mix of business, change in rate level) • External environment (e.g., inflationary or legal environment) Range of weight: 3-7 percent	a. Effect on estimation techniques due to change in: rate levels, claim ratio, mix of business b. Use of trend factors and tort reform factors in estimation techniques c. Identification of changes in case outstanding adequacy d. Adjustment for changes in case outstanding adequacy e. Identification of changes in rate of claims settlement f. Adjustment for changes in rate of claims settlement
READINGS	
Friedland, Chapters 7 -14	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
6. Estimate recoveries. Range of weight: 0-5 percent	a. Salvage and subrogation b. Reinsurance c. Key assumptions of estimation techniques
READINGS	
Friedland, Chapter 14	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
7. Estimate unpaid claim adjustment expenses. Range of weight: 2-7 percent	a. Organization of the data b. Estimation of unpaid ALAE c. Estimation of unpaid ULAE d. Key assumptions of estimation techniques e. Strengths and weaknesses of the estimation techniques for claim related expenses
READINGS	
Friedland, Chapters 1, 3, 16, and 17	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
8. Appraise and validate the results of the estimation process for adequacy and reasonableness. Range of weight: 4-8 percent	a. Components of evaluation: <ul style="list-style-type: none"> • Multiple methods • Explanation of differences • Test statistics (e.g., claim ratios, severities, pure premiums, frequencies, indicated unpaid claims) b. Monitoring and interim valuations
READINGS	
Friedland, Chapter 15	

Complete Text References for Exam 5

Text references are alphabetized by the citation column.

Citation	Abbreviation	Learning Objective	Source
Actuarial Standards Board of the American Academy of Actuaries, "Actuarial Standard of Practice No. 13, Trending Procedures in Property/Casualty Insurance Ratemaking."	ASOP 13	A3, A4	OP
American Academy of Actuaries Committee on Risk Classification, "Risk Classification Statement of Principles," June 1980. (Available at no charge from the American Academy of Actuaries at (202) 223-8196 or on the Academy's Website at www.actuary.org.	AAA	A8	OP
Casualty Actuarial Society Committee on Ratemaking Principles, <i>Statement of Principles Regarding Property and Casualty Insurance Ratemaking</i> , Casualty Actuarial Society, May 1988.	CAS Principles	A6	OP
Feldblum, S., "Personal Automobile Premiums: An Asset Share Pricing Approach for Property-Casualty Insurance," <i>PCAS LXXXIII</i> , 1996, pp. 190-256 (excluding Sections 7-9).	Feldblum	A13	OP
Friedland, J.F., <i>Estimating Unpaid Claims Using Basic Techniques</i> , Casualty Actuarial Society, Third Version, July 2010. Appendices A and B are integral parts of this reading.	Friedland	B1-B8	OP
Insurance Services Office, Inc., Personal Automobile Manual (Effective 6-98), General Rules 1-6 only. The entire manual is included for completeness.	ISO PAM	A1	SK
Werner, G, and Modlin, C., <i>Basic Ratemaking</i> , Casualty Actuarial Society, Fourth Edition, October 2010. [The Appendices are an integral part of the textbook and will be used for creating questions.]	Werner & Modlin	A1-A12	OP

Source Key

- OP** Online publication—available at no charge and is linked from the text references section above.
- SK** Material in the 2012 CAS Study Kit.

Items printed in **red** indicate an update, clarification, or change.

Publishers and Distributors

Contact information is furnished for those who wish to purchase the text references cited for Exam 5. Publishers and distributors are independent and listed for the convenience of candidates; inclusion does not constitute endorsement by the CAS.

Actex Publications (Mad River Books), 107 Groppo Drive, Suite A, P.O. Box 974, Winsted, CT 06098; telephone: (800) 282-2839 or (860) 379-5470; fax: (860) 738-3152; e-mail: retail@actexmadriver.com; Website: www.actexmadriver.com.

Actuarial Bookstore, P.O. Box 69, Greenland, NH 03840; telephone: (800) 582-9672 (U.S. only) or (603) 430-1252; fax: (603) 430-1258; Website: www.actuarialbookstore.com.

Actuarial Standards Board, American Academy of Actuaries, 475 N. Martingale Road, Suite 600, Schaumburg, IL 60173; telephone: (847) 706-3513; fax: (847) 706-3599.

Casualty Actuarial Society, 4350 N. Fairfax Drive, Suite 250, Arlington, VA 22203; telephone: (703) 276-3100; fax: (703) 276-3108; e-mail: office@casact.org; Website: www.casact.org.

SlideRule Books, P.O. Box 69, Greenland, NH 03840; telephone: (877) 407-5433 or (603) 373-6140; fax: (877) 417-5433 or (603) 430-1258; Website: www.sliderulebooks.com.

Archives 2012

2012 Exam 6-Canada Syllabus

Regulation and Financial Reporting (Nation Specific)

The syllabus for this four-hour exam is defined in the form of learning objectives, knowledge statements, and readings.

LEARNING OBJECTIVES set forth, usually in broad terms, what the candidate should be able to do in actual practice. Included in these learning objectives are certain ones that may not be possible to perform on an examination, such as complex simulations, but that the candidate would still be expected to explain in the context of an examination.

KNOWLEDGE STATEMENTS identify some of the key terms, concepts, and methods that are associated with each learning objective. These knowledge statements are not intended to represent an exhaustive list of topics that may be tested, but they are illustrative of the scope of each learning objective.

READINGS support the learning objectives. It is intended that the readings, in conjunction with the material on the lower numbered examinations, provide sufficient resources to allow the candidate to perform the learning objectives. Some readings are cited for more than one learning objective. The Syllabus and Examination Committees emphasize that candidates are expected to use the readings cited in this *Syllabus* as their primary study materials.

Thus, the learning objectives, knowledge statements, and readings complement each other. The learning objectives define the purpose, the knowledge statements illustrate more fully the intended scope of the learning objectives, and the readings provide the source material to achieve the learning objectives. Learning objectives should not be seen as independent units, but as building blocks for the understanding and integration of important competencies that the candidate will be able to demonstrate.

Note that the range of weights shown should be viewed as a guideline only. There is no intent that they be strictly adhered to on any given examination—the actual weight may fall outside the published range on any particular examination.

The overall section weights should be viewed as having more significance than the weights for the individual learning objective. Over a number of years of examinations, absent changes, it is likely that the average of the weights for each individual overall section will be in the vicinity of the guideline weight. For the weights of individual learning objective, such convergence is less likely.

On a given examination, in which it is very possible that not every individual learning objective will be tested, there will be more divergence of guideline weights and actual weights. Questions on a given learning objective may be drawn from any of the listed readings, or a combination of the readings. There may be no questions from one or more readings on a particular exam.

After each set of learning objectives, the readings are listed in abbreviated form. Complete text references are provided at the end of this exam syllabus.

In addition, this exam assumes that the candidate has completed Online Course 2. Online Course 2 contains fundamental background material for both Section A (Regulation of Insurance and Canadian Insurance Law) and Section C (Financial Reporting).

Items marked with a bold **SK** or **SKU** constitute the 2012 Exam 6-Canada Study Kit that may be purchased from the CAS Online Store. The 2012 Update to the 2011 Study Kit includes only the new items marked with a bold **SKU**; the Update may be purchased from the CAS Online Store. Items marked with a bold **OP** (Online Publication) are available at no charge and may be downloaded from links in the Complete Text References section below.

Please check the “Syllabus Updates” section of the CAS Web Site for any changes to the Syllabus.

The inherent nature of the material addressed in this nation-specific exam makes it subject to continual development and change. It is expected that the candidates will respond to exam questions based on the current syllabus presented below. Recognizing the changing nature of law, regulation, and financial reporting requirements, however, the Examination Committee will strive to acknowledge candidates who also respond with the current state in their solutions to examination questions.

A. Regulation of Insurance and Canadian Insurance Law

Range of weight for Section A: 20-25 percent

Candidates should understand the role of the insurance business as a supplier of a vital service. Because of the essential and highly technical nature of insurance, a system of regulatory controls has been established requiring insurers to demonstrate that they are providing fair and reliable services in accordance with the statutes and regulations of each jurisdiction.

The material in this section encompasses Canadian and U.S. insurance legislation and regulations including their historical development. Judicial decisions affect insurance regulation and insurance benefits to the extent they interpret the law and thereby modify regulatory behavior. Candidates are presented with a number of Canadian cases that have contributed to the development of legal precedents in the area of insurance.

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
1. Describe the historical development of insurance legislation and regulations, including the division of responsibility between federal and provincial/state regulators. Range of weight: 2-6 percent	a. British North America Act b. Privy Council c. Federal and provincial regulation of insurance d. Office of the Superintendent of Financial Institutions e. Insurance Companies Act f. Foreign and provincial insurance companies g. Canadian insurance industry h. Nature of Canadian insurance regulations
READINGS	
Baer and Rendall ICA KPMG PACICC McDonald Noonan	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
2. Discuss the current state of insurance regulation in Canada. Range of weight: 5-10 percent	a. Effects of rate regulation b. Rate filing guideline requirements in Alberta and Ontario c. Newfoundland automobile insurance d. Newfoundland homeowners insurance e. Health care costs recovery in British Columbia f. Reforms in Ontario automobile insurance g. Use of credit scoring in ratemaking and underwriting practices h. Market conduct i. Brokers' disclosure responsibilities regarding conflicts of interest and fees j. Solvency

READINGS
AAA Credit Scores Alberta BCHCCRA FSCO 5-Year Review FSCO A-01/10 FSCO Auto Reforms FSCO Private Auto FSCO Reg. 664 IBC Code of Conduct IBC Rate Regulation KPMG et al. KPMG PACICC McCarty N&L PUB Auto N&L PUB Property OSFI Framework RIBO Code of Conduct

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
3. Discuss the issues, outcome, rationale and implications of landmark decisions for the insurance industry Range of weight: 5-10 percent	a. Specific landmark court decisions cited in the Readings section b. Canadian cap for non-pecuniary general damages <ol style="list-style-type: none"> 1. Trilogy of Supreme Court of Canada decisions 2. Limits on damages 3. Current state of cap 4. Exceptions to cap

READINGS
Baer and Rendall Davidson KPMG et al. Landmark Legal McDonald

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
4. Describe the litigation environment with respect to insurance. Range of weight: 2-6 percent	a. Trends in tort litigation, including tort reform and class action suits b. Mass torts (e.g., asbestos) c. Types of litigation costs d. Canadian litigation system vs. other systems

READINGS
AAA Mass Torts ATRA BCHCCRA Harris KPMG et al. Towers Watson

B. Government and Industry Insurance Programs

Range of weight for Section B: 20-25 percent

This section focuses primarily on the identification of major Canadian insurance programs administered by government agencies and insurance industry organizations. The candidates are expected to have an understanding of the objectives, operations, and effectiveness of the following programs:

- Flood insurance
- Crop insurance
- Employment insurance
- Health care insurance
- Residual personal insurance markets (e.g., auto, property)
- Workers compensation insurance
- Pension plans
- Guaranty funds including the Canadian Property and Casualty Insurance Compensation Corporation (“PACCIC”)
- Terrorism Insurance (“TRIA”)

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
<p>1. Describe the origin and purpose of specific government and insurance industry programs.</p> <p>Range of weight: 5-10 percent</p>	<p>a. Reason for inception</p> <p>b. Major historical developments</p> <p>c. Philosophy of program</p>
<p>2. Describe the operations and risk transfer process for each government and insurance industry program listed in the introduction to Section B and their interactions with the voluntary private insurance sector.</p> <p>Range of weight: 5-10 percent</p>	<p>a. Funding mechanisms and sources of funding</p> <p>b. Allocation/assignment of exposures and associated costs</p> <p>c. Automobile residual market participation ratios</p> <p>d. Eligibility provisions</p> <p>e. Claim settlement and insurance coverage provisions</p> <p>f. Welfare (subsidization) versus insurance principles</p> <p>g. Private response to gap in government program</p> <p>h. Government response to gap in private program</p>
<p>3. Evaluate the effectiveness of a government and insurance industry program (actual, as listed in the introduction to Section B, or hypothetical).</p> <p>Range of weight: 5-10 percent</p>	<p>a. How to measure performance of programs:</p> <ul style="list-style-type: none"> • Solvency • Efficiencies • Stability • Viability and long term prospects <p>b. How well program meets its purpose</p> <p>c. Effect of external factors (e.g., economic conditions, weather, regulation, etc.)</p>

READINGS
Agricultural Programs CAS Dibra and Leadbetter Dutil GAA KPMG et al. Morneau Sobeco PACICC Swiss Re

C. Financial Reporting

Range of weight for Section C: 45-50 percent

This section addresses financial reporting and solvency issues. The intent is to address Canadian and global issues related to the reporting of financial results for property and casualty insurers. The core of the syllabus focuses on Canadian issues with an overview of relevant differences in other countries.

Candidates should have detailed knowledge of the contents, purposes, and recent changes in the Canadian Annual Return, including recent guidelines issued by the Office of the Superintendent of Financial Institutions (OSFI) and the provincial regulatory authorities.

Candidates should understand the details of, and the reasons for, the differences between Generally Accepted Accounting Principles (GAAP), International Financial Reporting Standards (IFRS) and Statutory Accounting Principles (SAP).

This section is complemented by readings on solvency monitoring systems such as the Minimum Capital Test (MCT), Dynamic Capital Adequacy Testing (DCAT) and Solvency II.

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
1. Describe the elements and prepare the schedules of the Canadian Annual Return and U.S. Annual Statement. Use these schedules as well as other tools to review the financial health of an insurance entity. Range of weight: 25-30 percent	a. OSFI Annual Return b. Valuation of assets and liabilities c. Reinsurance accounting issues including calculation of reinsurance penalties d. Calculation of excess (deficiency) ratio of net claim liabilities e. Calculation of change in surplus f. Calculation of net income and comprehensive income g. MCT h. MSA ratios i. Key financial measures used by rating agencies j. NAIC Annual Statement <ul style="list-style-type: none"> • Assets • Liabilities, Surplus and Other Funds • Statement of Income • Cash Flow • Schedule P

READINGS
Cantin and Trahan CCIR Instructions CIA Accounting Standards CIA CSOP CIA Disclosure CIA Discounting CIA Materiality CIA Runoff CIA Taxes Feldblum IASA MSA NAIC Accounting NAIC Annual Statement OSFI Annual Return OSFI Earthquake OSFI Memorandum OSFI MCT

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
2. Calculate MCT and use MCT and DCAT to evaluate the financial health of an insurance entity. Range of weight: 5-8 percent	a. MCT formulae b. Definition of the components of the MCT c. DCAT <ul style="list-style-type: none"> • Purpose • Statement of opinion • Plausible scenarios and ripple effects • Management actions d. Stress testing e. Target capital ratios

READINGS
CIA DCAT OSFI MCT OSFI Stress Testing OSFI Target Capital

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
3. Distinguish between different financial reporting standards. Range of weight: 5-8 percent	a. Canadian GAAP b. Canadian valuation of policy liabilities c. U.S. GAAP d. U.S. SAP e. Difference between U.S. GAAP and SAP f. IFRS g. Rules-based and principles-based solvency regulation (RBC, MCT, and Solvency II)

READINGS
Cheng CIA Accounting Standards CIA Disclosure CIA Discounting CIA MfAD DeFrain IASA IFRS 4 KPMG Solvency II NAIC Accounting OSFI Vision

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
4. Identify reinsurance accounting issues and explain their effect on financial reporting for an insurance entity. Range of weight: 5-8 percent	a. Financial effect of different types of reinsurance b. Risk transfer c. Commutations d. Effect of reinsurance on MCT

READINGS
Blanchard FASB 113 Freihaut and Vendetti NAIC SSAP 62 OSFI MCT Steeneck

D. Professional Responsibilities of the Actuary in Financial Reporting

Range of weight for Section D: 8-12 percent

This section focuses on the professional responsibilities of the appointed actuary related to the reporting of financial results by property and casualty insurers in Canada. The candidate will be required to understand the various statutory requirements of the appointed actuary under the Insurance Companies Act and the provincial insurance acts related to financial reporting and general corporate governance.

The material in this section encompasses sections of federal and provincial insurance laws and regulations, regulatory guidelines, and professional standards of practice and educational notes issued by the Canadian Institute of Actuaries that are related to the financial reporting of general insurers.

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
1. Explain the responsibilities of an actuary as defined by standards of practice, regulators, and insurance laws for financial reporting. Range of weight: 8-12 percent	a. Statutory Actuarial Opinion b. Contents of Statutory Reports of the Actuary c. Standards of Practice d. Educational Notes e. Insurance Companies Act f. Actuary and auditor relationship g. Regulatory requirements

READINGS
CIA Accounting Standards
CIA CSOP
CIA DCAT
CIA Disclosure
CIA Discounting
CIA Materiality
CIA MfAD
CIA Runoff
CIA Subsequent Events
CIA Taxes
CIA Valuation
ICA
KPMG PACICC
OSFI Earthquake
OSFI Memorandum

Complete Text References for Exam 6–Canada

Text references are alphabetized by the citation column.

NOTE: The inherent nature of the material addressed in this nation-specific exam makes it subject to continual development and change. It is expected that the candidates will respond to exam questions based on the current syllabus presented below. Recognizing the changing nature of law, regulation, and financial reporting requirements, however, the Examination Committee will strive to acknowledge candidates who also respond with the current state in their solutions to examination questions.

Citation	Abbreviation	Learning Objective	Source
Agriculture and Agri-Food Canada, <i>Canada's Agricultural Business Risk Management Programs</i> , pages 1-8.	Agricultural Programs	B1-3	SK
"Alberta Insurance Act, Premium Regulation," Appendix, Schedules 1-3, pp. 15-22.	Alberta	A2	SK
American Academy of Actuaries Mass Torts Subcommittee, " Current Issues in Asbestos Litigation ," Issues Brief, February 2006. Candidates will not be responsible for material in the attachments.	AAA Mass Torts	A4	OP
American Academy of Actuaries, " NAIC Public Hearing on Credit-Based Insurance Scores ," April 30, 2009.	AAA Credit Scores	A2	OP
"ATRA Tort Reform Record," CAS Study Note, July 1, 2010.	ATRA	A4	SK

Citation	Abbreviation	Learning Objective	Source
Baer, M.G.; and Rendall, J.A., <i>Cases on the Canadian Law of Insurance</i> (Sixth Edition), Carswell, 2000, pp. 67-91, 93-100 302-304, 518-529, 821-827 and 829-831. Candidates are responsible for the following cases: <i>Glenn v. Scottish Union and National Insurance Company Ltd.</i> (Chapter 1); <i>Regal Films Corporation Ltd. v. Glens Falls Insurance Company</i> (Chapter 2); <i>Fletcher v. MPIC</i> (Chapter 8); <i>Broadhurst and Ball v. American Home</i> ; and <i>Dillon v. Guardian Insurance</i> (Chapter 11).	Baer and Rendall	A1, A3	SK
Blanchard, R.S., " Basic Reinsurance Accounting—Selected Topics ," CAS Study Note, October 2010.	Blanchard	C4	OP
British Columbia Health Care Costs Recovery Act, [SBC 2008], Chapter 27 .	BCHCCRA	A2, A4	OP NEW
Canadian Council of Insurance Regulators, Annual Statement Instructions P&C-1, 2011 , Sections I, III, IV, V, and VI, excluding instructions for Annual Return pp. 10.10-10.30, 20.60, 40.10-50.50, 67.15, 67.31, 70.40, 90.15 and 90.70. NOTE: Please use the 2011 edition that has been archived on the CAS Web Site with permission for educational purposes (use new link above).	CCIR Instructions	C1	OP NEW
Canadian Institute of Actuaries, Consolidated Standards of Practice, 1620, 1630, 2200, 2400, and 2500 .	CIA CSOP	C1, D1	OP
Canadian Institute of Actuaries, " Draft Educational Note: Subsequent Events ," October 2008.	CIA Subsequent Events	D1	OP
Canadian Institute of Actuaries, " Educational Note: Consideration of Future Income Taxes in the Valuation of Policy Liabilities ," July 2005.	CIA Taxes	C1, D1	OP
Canadian Institute of Actuaries, " Educational Note: Discounting ," November 2010.	CIA Discounting	C1, C3 D1	OP
Canadian Institute of Actuaries, " Educational Note: Dynamic Capital Adequacy Testing—Life, Property and Casualty ," November 2007. Candidates are not responsible for details related to life insurance companies.	CIA DCAT	C2, D1	OP
Canadian Institute of Actuaries, " Educational Note: Evaluation of the Runoff of Claim Liabilities when the Liabilities are Discounted in Accordance with Accepted Actuarial Practice ," May 2011.	CIA Runoff	C1, D1	OP
Canadian Institute of Actuaries, " Educational Note: Implications of CICA Accounting Standards 3855 and 1530 ," January 2007.	CIA Accounting Standards	C1, C3 D1	OP
Canadian Institute of Actuaries, " Educational Note: “Guidance for the 2010 Valuation of Policy Liabilities and DCAT for Property and Casualty Insurers ,” October 2010. Candidates will not be tested directly on material in this Educational Note. However, candidates may find this Educational Note valuable in understanding the obligations of the Appointed Actuary with respect to the valuation of policy liabilities and DCAT.	CIA Valuation	(D1)	OP

Citation	Abbreviation	Learning Objective	Source
Canadian Institute of Actuaries, " Educational Note: Margins for Adverse Deviations for Property-Casualty Insurance ," December 2009.	CIA MfAD	C3, D1	OP
Canadian Institute of Actuaries, " Report: Materiality ," October 2007. Candidates are not responsible for material in the Appendix.	CIA Materiality	C1, D1	OP
Canadian Institute of Actuaries, " Research Paper: Disclosure Requirements IFRS 4–Insurance Contracts for P&C Insurers ," October 2010.	CIA Disclosure	C1, C3, D1	OP
Cantin, C.; and Trahan, P., " Study Note on the Actuarial Evaluation of Premium Liabilities ," CAS Study Note, May 1999. Candidates will be responsible for Exhibits but not for Appendices.	Cantin and Trahan	C1	OP
CAS Study Note, " Government Insurers Study Note ," May 2008, pp. 1-4 and 17-20.	CAS	B1-3	OP
Cheng, J.S., <i>Fair Value of Claims Liabilities</i> , March 2007, J.S. Cheng & Partners Inc.	Cheng	C3	SK
Davidson, J., " The Cap on Non Pecuniary General Damages: Where is it Going and How Does it Affect Litigation? "	Davidson	A3	OP
DeFrain, K., " The Impact of International Financial Reporting Standards on U.S. Actuarial Practice ," CAS Study Note, November 5, 2010.	DeFrain	C3	OP
Dibra, S.; and Leadbetter, D., "Why insurers fail: The dynamics of property and casualty insurance insolvency in Canada," Property and Casualty Insurance Compensation Corporation, 2007.	Dibra and Leadbetter	B1-3	SK
Dutil, R., " Facility Association ," CAS Study Note, May 2008.	Dutil	B1-3	OP
Feldblum, S., "Rating Agencies," CAS Study Note, October 3, 2011, pp. 1-7 and 14-19. Candidates are not responsible for Section 4, Appendices B-D, and the end notes.	Feldblum	C1	OP NEW
Financial Accounting Standards Board "Statement of Financial Accounting Standards No. 113, Accounting and Reporting for Reinsurance of Short-Duration and Long-Duration Contracts," December 1992, Paragraphs 6-11, 14-18a, 21-22, 25, 28, 34-67, 70-74, 79-80, 82-85 and 94-109. Candidates are not responsible for material relating to long-duration contracts and/or life insurance.	FASB 113	C4	SK
Financial Services Commission of Ontario, Bulletin No. A-01/10, " Changes to Automobile Insurance Regulations ."	FSCO A-01/10	A2	OP
Financial Services Commission of Ontario, Auto Insurance Services e-Newsletter, April 2010, Issue 2, " Automobile Insurance Reforms ."	FSCO Auto Reforms	A2	OP

Citation	Abbreviation	Learning Objective	Source
Financial Services Commission of Ontario, " Private Passenger Automobile Filing Guidelines–Major ," March 2009.	FSCO Private Auto	A2	OP
Financial Services Commission of Ontario, " Regulation 664 of the Revised Regulations of Ontario 1990 Automobile Insurance made under the Ontario Insurance Act ," last amended version under Ontario Regulation 291/10.	FSCO Reg. 664	A2	OP
Financial Services Commission of Ontario, " Report on the Five Year Review of Automobile Insurance ," March 31, 2009.	FSCO 5-Year Review	A2	OP
Freihaut, D.; and Vendetti, P., " Common Pitfalls and Practical Considerations in Risk Transfer Analysis ," Casualty Actuarial Society <i>E-Forum</i> , Spring 2009. Appendices A and B are for information only and will not be directly tested.	Freihaut and Vendetti	C4	OP
Groupement des Assureurs Automobile Risk Sharing Plan–Procedures Manual, March 2011, By-Law No. 7, Chapters 1-10 and Section 15, General Description of the Plan, and Sections 15-A to 15-H. [Note: the Manual is dated March 2011, but the section on By-Law no. 7 is dated January 2011.]	GAA	B1-3	SKU NEW
Harris, C., " Tort Reform Tension ," Canadian Underwriter.ca, August 2005.	Harris	A4	OP
International Financial Reporting Standards Foundation, IFRS 4, " Insurance Contracts ," as of 31 December 2010. [It is necessary to register (for free) on the IFRS Foundation Web Site in order to access the document.]	IFRS 4	C3	OP NEW
Insurance Accounting and Systems Association, <i>Property-Casualty Insurance Accounting</i> (Eighth Edition), 2003, Chapters 2, 5, 9, 10, and 18 (excluding the section on the "Minimum Capital Test," pages 18-22 to 18-24). Candidates will not be responsible for additional material from references to "Relevant Literature." The 2006 update to the 2003 edition is required.	IASA	C1, C3	B
Insurance Bureau of Canada, " Code of Conduct for Insurers' use of Credit Information (CODE) ."	IBC Code of Conduct	A2	OP NEW
Insurance Bureau of Canada, "The Effects of Rate Regulation on the Volatility of Auto Insurance Prices: Evidence from Canada," June 2005. Candidates are responsible for the appendices but are not responsible for material in the tables.	IBC Rate Regulation	A2	SK
"Insurance Companies Act," <i>Financial Institutions Act</i> , Chapter 47, Sections 165(1), 165 (2), 203, 331(1), 331(2), 331(4), 346, 357-370, 464, 465, 476-478, 516(1), 516(4), 517, 581, 626-632, 641, 664, 665, 667(1), 667(2), and 674 (updated to August 31, 2004).	ICA	A1, D1	SK
KPMG, Eckler Partners Ltd. & Exactor Insurance Services, Inc., "Motor Vehicle Insurance in British Columbia—At the Crossroads, Volume II: Options and Choices," Section II excluding Section F.	KPMG et al.	A2-4, B1-3	SK

Citation	Abbreviation	Learning Objective	Source
KPMG, "Property and Casualty Insurance Compensation Corporation (PACICC), The P&C Actuary's Role in Solvency Monitoring."	KPMG PACICC	A1, A2, D1	SKU NEW
KPMG, "Solvency II," pp. 3 to 8 only.	KPMG Solvency II	C3	SKU NEW
"Landmark Legal Insurance Cases in Canada" which covers the following cases: Whiten v. Pilot Insurance Co.; Somersall v. Friedman; Somersall v. Scottish and York; Sansalone v. Wawanesa Mutual Insurance Co.; Nichols v. American Home Assurance Co.; Amos v. Insurance Corporation of British Columbia; KP Pacific Holdings Ltd. v. Guardian Insurance Co. of Canada; Alie v. Bertrand & Frere Construction Company Limited; British Columbia v. Imperial Tobacco Canada Ltd.; Herbison v. Lumbermens Mutual Casualty Co; Vytlingam v. The Citadel General Assurance Company; Resurface Corp. v. Hanke; and Morrow v. Zhang (Sections I, II, III, IV, VI (E), VII, VIII, and IX.).	Landmark Legal	A3	SKU NEW
McCarty, K.M., " Testimony of Kevin M. McCarty, Florida Insurance Commissioner, Florida Office of Insurance Regulation and Representing the National Association of Insurance Commissioners, Regarding: 'The Impact of Credit-Based Insurance Scoring on the Availability and Affordability of Insurance,' May 21, 2008, " Subcommittee on Oversight and Investigations of the House Committee on Financial Services, excluding Appendices 1 and 2.	McCarty	A2	OP
McDonald, B.R., <i>Life Insurance Laws of Canada (Common Law Provinces)</i> , Life Underwriters Association of Canada, 1995, pp. A1-1, A2-1 to A2-9, B1-1 to B1-2, B2-1 to B2-3, and B4-1 to B4-3. Candidates are responsible for all cases cited in this text.	McDonald	A1, A3	SK
<i>Morneau Sobeco Handbook of Canadian Pension and Benefit Plans</i> (Fourteenth Edition), 2008, CCH Canadian Limited, Chapters 3 and 14-17.	Morneau Sobeco	B1-3	B
MSA Research, Inc., "MSA Report on Property & Casualty, Canada, 2010," Section 3, pp. 1-9.	MSA	C1	SK
National Association of Insurance Commissioners, <i>Accounting Practices and Procedures Manual</i> , 2010, Preamble, pp. P-1 to P-12.	NAIC Accounting	C1, C3	SK
National Association of Insurance Commissioners, <i>Accounting Practices and Procedures Manual</i> , 2010, Statement of Statutory Accounting Principles 62, "Property and Casualty Reinsurance," paragraphs 1-82.	NAIC SSAP 62	C4	SK

Citation	Abbreviation	Learning Objective	Source
National Association of Insurance Commissioners, <i>Official NAIC Annual Statement Blanks, Property and Casualty, 2011</i> (both individual and consolidated basis), pp. 2-4, Schedule P. Candidates will be expected to have knowledge of other sections of the annual statement that are discussed in other <i>Syllabus</i> readings.	NAIC Annual Statement	C1	B NEW
Newfoundland and Labrador Public Utilities Board, 2005 Automobile Insurance Benchmark Hearing, "A submission by the Insurance Bureau of Canada," November 2004.	N&L PUB Auto	A2	SK
Newfoundland and Labrador Public Utilities Board Homeowners' Insurance Review, "A Submission by the Insurance Bureau of Canada," December 2005.	N&L PUB Property	A2	SK
Noonan, B., " Protecting the Pledge ," <i>Foundations of Regulation, Best's Review</i> , October 2005.	Noonan	A1	OP
Office of the Superintendent of Financial Institutions Canada, " 2011 Memorandum for the Actuary's Report on Property and Casualty Insurance Business ."	OSFI Memorandum	C1, D1	OP NEW
Office of the Superintendent of Financial Institutions Canada, " Earthquake Exposure Sound Practices Guideline ," May 1998, including Appendices 1 and 2. Candidates are not responsible for the tables in Appendix 2.	OSFI Earthquake	C1, D1	OP
Office of the Superintendent of Financial Institutions Canada, " Key Principles for the Future Direction of the Canadian Regulatory Capital Framework for Property and Casualty Insurance ," January 2010.	OSFI Framework	A2	OP
Office of the Superintendent of Financial Institutions Canada Guideline, " Internal Target Capital Ratio for Insurance Companies ," June 2011.	OSFI Target Capital	C2	OP NEW
Office of the Superintendent of Financial Institutions Canada Guideline, " Minimum Capital Test (MCT) for Federally Regulated Property and Casualty Insurance Companies ," December 2010, pp. 1-14 and 20-25.	OSFI MCT	C1, C2, C4	OP
Office of the Superintendent of Financial Institutions Canada Guideline E-18, " Stress Testing ," December 2009.	OSFI Stress Testing	C2	OP
Office of the Superintendent of Financial Institutions Canada, " Canadian Vision for Property and Casualty Insurer Solvency Assessment ," December 2011.	OSFI Vision	C3	OP NEW
Office of the Superintendent of Financial Institutions Canada Uniform Annual Return, 2011 , Approved by the Canadian Council of Insurance Regulators—P&C-1, pp. 10.40-10.42, 10.60, 20.10-20.52, 30.70-30.71, 40.07, 60.10-60.50, 67.10, 67.20-67.30, 70.10-70.21, 70.38, 80.10-80.20, and 99.10. NOTE: Please use the 2011 edition that has been archived on the CAS Web Site for educational purposes (use new link above).	OSFI Annual Return	C1	OP NEW

Citation	Abbreviation	Learning Objective	Source
Property and Casualty Insurance Compensation Corporation, "Guide to Compensation Plan for Property and Casualty Insurers," June 2009 .	PACICC	B1-3	SKU NEW
Registered Insurance Brokers of Ontario, Code of Conduct , August 2007, pp. 26-36.	RIBO Code of Conduct	A2	OP
Steenek, L.R., " Commutation of Claims ," CAS Study Note.	Steenek	C4	OP
Swiss Re, "Making Flood Insurable for Canadian Homeowners," November 2010, Sections 3, 5, 6, 7, and 8.	Swiss Re	B1-3	SKU NEW
Towers Watson, " 2010 Update on U.S. Tort Cost Trends ." Candidates will not be responsible for statistics contained within the paper or material from the tables or appendices.	Towers Watson	A4	OP

Source Key

- B** Book—may be purchased from the publisher or bookstore or borrowed from the CAS Library.
- NEW** Indicates new or updated material.
- OP** Online publication—available at no charge and is linked from the text references section above.
- SK** Material included in the 2012 CAS Study Kit.
- SKU** Material included in both the 2012 CAS Study Kit and the 2012 Update to the 2011 Study Kit.

Items printed in **red** indicate an update, clarification, or change.

Publishers and Distributors

Contact information is furnished for those who wish to purchase the texts cited for Exam 6-Canada. Publishers and distributors are independent and listed for the convenience of candidates; inclusion does not constitute endorsement by the CAS.

ACTEX Publications, 107 Groppo Drive, Suite A, P.O. Box 974, Winsted, CT 06098; telephone: (800) 282-2839 or (860) 379-5470; fax: (860) 738-3152; e-mail: retail@actexmadriver.com; Web site: www.actexmadriver.com.

Actuarial Bookstore, P.O. Box 69, Greenland, NH 03840; telephone: (800) 582-9672 (U.S. only) or (603) 430-1252; fax: (603) 430-1258; Web site: www.actuarialbookstore.com.

American Academy of Actuaries, 1100 Seventeenth Street NW, Seventh Floor, Washington, DC 20036; telephone: (202) 223-8196; Web site: www.actuary.org.

American Institute for Chartered Property Casualty Underwriters, Order Department, P.O. Box 3016, 720 Providence Road, Malvern, PA 19355-0716; telephone: (610) 644-2100; fax: (610) 640-9576.

Baer, M.G.; and Rendall, J.A., *Cases on the Canadian Law of Insurance* (Fifth Edition), 1995, Carswell, Attention: Customer and Order Services, One Corporate Plaza, 2075 Kennedy Road, Scarborough, Ontario M1T 3V4, Canada; telephone: (416) 609-3800 or (800) 387-5164; fax: (416) 298-5082; Web site: www.carswell.com.

Bowne Insurance Services, 1717 Arch Street, 31st Floor, Philadelphia, PA 19103; telephone: (215) 988-5690 or (800) 234-6859 (for the *NAIC Annual Statement Blanks, Property and Casualty*).

Canadian Institute of Actuaries, Secretariat, Suite 820, 360 Albert Street, Ottawa, Ontario K1R 7X7, Canada; telephone: (613) 236-8196; fax: (613) 233-4552; Web site: www.actuaries.ca.

Casualty Actuarial Society *Forum, Foundations of Casualty Actuarial Science* (Fourth Edition), *PCAS*, and *Discussion Paper Program*, Casualty Actuarial Society, 4350 N. Fairfax Drive, Suite 250, Arlington, VA 22203; telephone: (703) 276-3100; fax: (703) 276-3108; e-mail: office@casact.org; Web site: www.casact.org.

Facility Association, 151 Yonge Street, 18th Floor, Toronto, Ontario M5C 2W7, Canada; telephone: (416) 863-1750 or (800) 268-9572; fax: (416) 868-0894.

Financial Institutions Act, "Insurance Companies Act," Chapter 47, The Federal Publication, 388 King Street West, Toronto, Ontario M5V 1K2, Canada; telephone: (416) 860-1611.

Financial Services Commission of Ontario, 5160 Yonge Street, P.O. Box 85, North York, Ontario M2N 6L9, Canada; telephone: (416) 250-7250; fax: (416) 590-7070; Web site: www.ontarioinsurance.com.

Insurance Accounting and Systems Association, *Property-Casualty Insurance Accounting* (Eighth Edition), 2003, IASA Fulfillment Center, P.O. Box 51008, Durham, NC 27717; telephone: (800) 817-4272 or (919) 489-0991; fax: (800) 668-4272; Web site: www.iasa.org.

Insurance Bureau of Canada, 240 Duncan Mill Road, Suite 700, Toronto, Ontario M3B 1Z4, Canada; telephone: (416) 445-5912; fax: (416) 445-2183.

Morneau Sobeco Handbook of Canadian Pension and Benefit Plans (Thirteenth Edition), 2005, CCH Canadian Limited, 90 Shepherd East, Suite 300, North York, Ontario M2N 6X1, Canada; telephone: (416) 224-2248; fax: (800) 461-4131.

NAIC Annual Statement Blanks, Property and Casualty may be obtained from Bowne Insurance Services, 1717 Arch Street, 31st Floor, Philadelphia, PA 19103; telephone: (215) 988-5690 or (800) 223-3103.

National Association of Insurance Commissioners, 120 W. 12th Street, #1100, Kansas City, MO 64105; telephone: (816) 842-3600.

Office of the Superintendent of Financial Institutions Canada, 255 Albert Street, Ottawa, Ontario K1A 0H2 Canada; telephone: (613) 990-7788; fax: (613) 952-8219; Web site: www.osfi-bsif.gc.ca.

Exam 6-Actuarial Institute of Chinese Taipei Regulation and Financial Reporting

The Actuarial Institute of Chinese Taipei (AICT) uses the Casualty Actuarial Society examinations for its property-casualty actuaries. The CAS Board of Directors approved specific AICT exams (i.e., current AICT Exam 6GA3 on Actuarial Standard of Practice and Accounting and Exam 6GB3 on Insurance Regulations and Discipline) as fulfilling the nation-specific requirement for CAS membership effective January 1, 2010.

In the 2011 transition to a revised basic education structure, learning objectives from the 2010 nation-specific exams were mapped to both the new Exam 6 on Regulation and Financial Reporting and new Online Course 2 on Insurance Accounting, Coverage Analysis, Insurance Law, and Insurance Regulation. Because the AICT continues to cover material from both new Exam 6 and new Online Course 2, candidates who have passed both AICT Exams 6GA3 and 6GB3 will be granted credit for both CAS Exam 6-Taipei and Online Course 2.

For details on the administration of the AICT examinations, please contact:

Actuarial Institute of Chinese Taipei
10F.-1, No.216, Sec. 2
Nanchang Road, Zhongzheng District
Taipei 100
Taiwan (R.O.C.)
Telephone: 886-2-2364-9168
Fax: 886-2-3365-2283
E-mail: airc.org@gmail.com
Web Site in Chinese: http://airc.org.tw/2007/html/4-2-1.php?bookittm_id=2
Web Site in English: http://airc.org.tw/newsfiles/AICT_exam.pdf

Applying for CAS Exam Credit

If a candidate has passed both parts of the AICT nation-specific exam (current AICT Exams 6GA3 and 6GB3) after January 1, 2010, then the candidate may apply for exam credit with the CAS. To receive credit for CAS Exam 6-Taipei and Online Course 2, the candidate should submit a written request to the CAS Member Resource Center (mrc@casact.org). The request must include the candidate's full legal name, contact information (including mailing address and telephone number), date of birth, and the administration (month/year of exam) that each of the AICT nation-specific exam parts was passed. The Member Resource Center will verify the exam information with the AICT and then update the candidate's record to reflect the credit as appropriate.

2012 Exam 6—United States Syllabus Regulation and Financial Reporting (Nation Specific)

The syllabus for this four-hour exam is defined in the form of learning objectives, knowledge statements, and readings.

LEARNING OBJECTIVES set forth, usually in broad terms, what the candidate should be able to do in actual practice. Included in these learning objectives are certain ones that may not be possible to perform on an examination, such as complex simulations, but that the candidate would still be expected to explain in an examination setting.

KNOWLEDGE STATEMENTS identify some of the key terms, concepts, and methods that are associated with each learning objective. These knowledge statements are not intended to represent an exhaustive list of topics that may be tested, but they are illustrative of the scope of each learning objective.

READINGS support the learning objectives. It is intended that the readings, in conjunction with the material on the lower numbered examinations, provide sufficient resources to allow the candidate to perform the learning objectives. Some readings are cited for more than one learning objective. The Syllabus and Examination Committees emphasize that candidates are expected to use the readings cited in this *Syllabus* as their primary study materials.

Thus, the learning objectives, knowledge statements, and readings complement each other. The learning objectives define the behavior, the knowledge statements illustrate more fully the intended scope of the learning objectives, and the readings provide the source material to achieve the learning objectives. Learning objectives should not be seen as independent units, but as building blocks for the understanding and integration of important competencies that the candidate will be able to demonstrate.

Note that the range of weights shown should be viewed as a guideline only. There is no intent that they be strictly adhered to on any given examination—the actual weight may fall outside the published range on any particular examination. The overall section weights should be viewed as having more significance than the individual learning objective weights. Over a number of years of examinations, absent changes, it is likely that the average of the weights for each individual overall section will be in the vicinity of the guideline weight. For the individual learning objective weights, such convergence is less likely. On a given examination, in which it is very possible that not every individual learning objective will be tested, there will be more divergence of guideline weights and actual weights. Questions on a given learning objective may be drawn from any of the listed readings, or a combination of the readings. There may be no questions from one or more readings on a particular exam.

After each set of learning objectives, the readings are listed in abbreviated form. Complete text references are provided at the end of this exam syllabus.

Items marked with a bold **SK** or **SKU** constitute the 2012 Exam 6-United States Study Kit that may be purchased from the CAS Online Store. The 2012 Update to the 2011 Study Kit includes only the new items marked with a bold **SKU**; the Update may be purchased from the CAS Online Store. Items marked with a bold **OP** (Online Publication) are available at no charge and may be downloaded from links in the Complete Text References section below.

Please check the “*Syllabus Updates*” section of the CAS Web Site for any changes to the *Syllabus*.

Section A of this examination covers insurance regulation with regards to property-casualty coverages, ratemaking, pricing, and solvency, and U.S. tort law as it affects the property-casualty business. Section B covers markets, coverages, and private and governmental programs for the property-casualty business in the United States. Section C covers the aspects of statutory, Generally Accepted Accounting Principles (GAAP), and International Financial Reporting Standards (IFRS) insurance accounting and taxation as these affect reserving and statutory reporting in the United States. Section D covers the

professional responsibilities of the appointed actuary according to the Property and Casualty Annual Statement Instructions issued by the National Association of Insurance Commissioners (NAIC). Section E presents the general concepts of reinsurance accounting to the candidate.

The candidate may wish to review the sections of CAS Online Course 2 on Insurance Accounting, Insurance Law, and Insurance Regulation as background for the exam.

A. Regulation of Insurance and United States Insurance Law

Range of weight for Section A: 20-30%

Candidates should understand that insurers are regulated by various governmental agencies because insurance is a valuable public service. An understanding of the dual U.S. state and federal regulatory system is required, along with the various state systems of regulation. The major areas of regulation for rate, contract terms, and solvency should be understood, as should the role of antitrust law as it pertains to insurance regulation.

Regulation as it affects insurance ratemaking in the U.S. is covered. Regulatory and political aspects of risk classification are also covered. Some learning objectives extend the topic to regulation and governmental actions designed to enhance the availability of insurance.

This section also covers the regulation for solvency in the U.S., including financial ratios tested by the National Association of Insurance Commissioners, Insurance Regulatory Information System (IRIS) tests and guaranty fund mechanisms set up by the various states. Also covered are risk-based capital calculations from the statutory blank and how they are used to monitor solvency.

U.S. tort law, while not a strictly actuarial subject, affects many areas of an actuary's work. The candidate may wish to review a microeconomic text or the appendix to Chapter 1 of the Miceli text. The judicial role in the development of tort law is also covered.

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
1. Describe the historic development and the current state of insurance regulation. Range of weight: 5-10 percent	a. Basis of insurance regulation b. Functions of NAIC c. Antitrust provisions d. Rate regulation
READINGS	
Harrington Kucera McCarty Musulin Porter 1 Wagner	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
2. Discuss the historic development of solvency regulation; describe current programs used to monitor solvency. Range of weight: 3-7 percent	a. NAIC accreditation program b. Solvency, including RBC, insolvency, insurance department examination, and NAIC regulatory tests such as IRIS c. Company licensing d. Receivership e. SEC reporting and regulation

READINGS
Feldblum (RBC) NAIC IRIS NAIC Solvency Porter 1 Porter 2

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
3. Describe current regulation addressing specialized insurance topics. Range of weight: 0-5 percent	<ul style="list-style-type: none"> a. Surplus Lines Companies b. Risk Retention Groups and Purchasing Groups c. Captives d. Admitted vs. Non-admitted Companies e. Catastrophe modeling f. Rating Agencies

READINGS
A.M. Best Feldblum (Rating Agencies) GAO Report Musulin Porter 1 Schwartzman and Ross

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
4. Discuss the issues, outcome, rationale, and implications of landmark decisions and antitrust laws for the insurance industry including the division of responsibility between federal and state regulators. Range of weight: 5-10 percent	<ul style="list-style-type: none"> a. Federal and State Antitrust Laws (e.g. Sherman Antitrust) b. McCarran-Ferguson c. Southeastern Underwriters d. Dodd-Frank Act e. Gramm Leach Bliley Act f. Paul vs. Virginia

READINGS
Harrington Porter 1 Schwartzman and Ross Wagner

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
5. Describe the U.S. litigation environment as applied to insurance. Range of weight: 0-5 percent	<ul style="list-style-type: none"> a. Ways regulators and insurers respond to these trends, e.g., policy language changes, new statutory requirements b. Mass torts (e.g., asbestos) and class action suits c. Role and influence of expert testimony and new theories/scientific findings in the U.S. tort system d. Judicial decisions that affect damages

READINGS
Asbestos Miceli RAND

B. Government and Industry Insurance Programs

Range of weight for Section B: 10-20 percent

This section focuses on the identification of major United States insurance programs administered by government agencies and insurance industry organizations. The candidates are expected to have an understanding of the objectives, operations, and effectiveness of the following insurance programs:

- Social Security
- Flood insurance
- Unemployment
- Medicare
- Residual markets (e.g., auto, workers compensation, property)
- Workers compensation
- Automobile Plans (e.g., MD Fund)
- Guaranty funds
- Government Backstops, e.g., TRIA and FL Cat Fund

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
<p>1. Describe the origin and purpose of government and industry insurance programs.</p> <p>Range of weight: 3-7 percent</p>	<p>a. Reason for inception</p> <p>b. Major historical development</p> <p>c. Philosophy of program</p>
READINGS	
<p>AAA Monograph Government Insurers Study Note Hamilton and Ferguson, pp. 6.31–6.34 and 9.36–9.40 Nyce Porter 2 Wiening et al. Williams Brown</p>	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
<p>2. Describe the operations and risk transfer process for government/industry programs and their interaction with voluntary private insurance sector.</p> <p>Range of weight: 3-7 percent</p>	<p>a. Funding mechanisms/sources</p> <p>b. Allocation/assignment of exposures and associated costs</p> <p>c. Eligibility provisions</p> <p>d. Claim settlement and insurance coverage provisions</p> <p>e. Welfare (subsidization) versus insurance principles</p> <p>f. Private response to gap in government program (e.g., Medigap, supplementary health)</p>
READINGS	
<p>AAA Monograph Bartlett et al. Government Insurers Study Note Hamilton and Ferguson, pp. 6.31–6.34 and 9.36–9.40 Nyce Porter 2 Wiening et al. Williams Brown</p>	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
3. Evaluate the effectiveness of a government/industry program. Range of weight: 3-7 percent	a. Solvency b. Efficiencies c. Stability d. Viability/longer term prospects e. How well program meets its purpose f. Effect of external factors (e.g., economic conditions, weather, regulation, etc.)
READINGS	
AAA Monograph Bartlett et al. Government Insurers Study Note Hamilton and Ferguson, pp. 6.31–6.34, 9.36–9.40 Nyce Porter 2 Wiening et al. Williams Brown	

C. Financial Reporting and Taxation

Range of weight for Section C: 30-50 percent

This section addresses financial reporting, solvency, and taxation issues. Candidates should have detailed knowledge of the contents, purposes, and recent changes in the NAIC Annual Statement and the Insurance Expense Exhibits. Knowledge of federal income tax treatment, including loss reserve discounting, is expected.

Candidates may find it valuable to review an actual insurer's Annual Statement to gain a more complete understanding of the key schedules, particularly the Notes to Financial Statements and General Interrogatories Sections. A candidate may review the Annual Statement of the company for which the candidate works or the Annual Statement of a publicly held company. There are links to publicly available Annual Statements of a few U.S. insurers in the citation for the NAIC Annual Statement Examples in the Complete Text References section below. Candidates are not responsible for the details of the companies' Annual Statement.

Candidates should understand the details of, and the reasons for, the differences between Generally Accepted Accounting Principles (GAAP), Statutory Accounting Principles (SAP), and International Financial Reporting Standards (IFRS).

This section is complemented by readings on solvency monitoring systems such as Risk Based Capital (RBC) and the IRIS ratios.

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
1. Describe the elements of the Annual Statement. Complete specific schedules and exhibits and use them to evaluate the financial health of an insurance entity. Range of weight: 20-25 percent	a. Balance sheet b. Income statement c. Change in surplus d. Schedule P e. Insurance Expense Exhibit f. Notes to financial statements g. Reinsurance accounting including Schedule F h. Underwriting and Investment Exhibit i. Exhibit of Premiums and Losses (Statutory Page 14)

READINGS
2011 IEE Feldblum (Discounting Notes, IEE, Schedule F, Schedule P, and Surplus) Feldblum and Blanchard IASA NAIC Annual Statement NAIC Annual Statement Examples NAIC SSAP 5R, 9, 53, 55, 62R, and 65

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
2. Evaluate an insurer's financial health, using RBC formulas and IRIS ratios. Range of weight: 5-10 percent	a. RBC formula b. Definition of components of RBC c. Calculation of IRIS ratios
READINGS	
Feldblum (RBC) NAIC IRIS	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
3. Differentiate between various accounting reporting principles and standards. Range of weight: 5-10 percent	a. U.S. Statutory Accounting Principles b. Generally Accepted Accounting Principles (SEC Filers) c. Adjustments to go from SAP to GAAP d. Fair Value of claims liabilities e. International Financial Reporting Standards f. Solvency II
READINGS	
Blanchard Insurance, pp. 21–24 DeFrain IASA, Chapter 14 NAIC APPM, Preamble Vaughan	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
4. Calculate specific elements of income tax and evaluate their implications for a property/casualty insurer. Range of weight: 0-5 percent	a. Discounting b. Elements of income tax calculation c. Statutory book income versus taxable income d. Alternative minimum tax e. Deferred Tax Asset and Deferred Tax Liability f. Temporary vs. permanent differences
READINGS	
Blanchard Insurance, pp. 21–24 Feldblum (Loss Reserve Discounting, Taxable Income, and Taxes and Investment Strategy)	

D. Professional Responsibilities of the Actuary in Financial Reporting

Range of weight for Section D: 10-15 percent

This section focuses on the professional responsibilities of the appointed actuary related to the reporting of financial results by property/casualty insurance companies in the United States of America. The identification of the appointed actuary is described in the Property and Casualty Annual Statement Instructions issued by the NAIC.

The candidate will be required to understand the various statutory requirements of the appointed actuary, and the appropriate professional standards and educational notes issued by the American Academy of Actuaries that are related to the financial reporting of property and casualty insurance companies.

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
1. Explain the responsibilities of an actuary as defined by standards of practice, regulators, and insurance laws for financial reporting. Range of weight: 10-15 percent	a. Statutory Prescribed Statement of Actuarial Opinion b. Standards of Practice c. Actuarial Report d. Actuary and auditor relationship e. Materiality f. Actuarial Opinion Summary
READINGS	
AAA Materiality Feldblum (Schedule P), pp. 69–72 COPLFR P&C Practice Note Actuarial Standards of Practice 20, 36, 41 and 43	

E. Reinsurance Accounting Principles

Range of weight for Section E: 5-10 percent

This section presents the general concepts of reinsurance accounting to the candidate. The candidate should become familiar with reinsurance accounting terminology and practice.

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
1. Describe reinsurance accounting terminology and practice, and evaluate considerations such as risk transfer testing and commutations. Range of weight: 5-10 percent	a. Identification and evaluation of insurance and financing components of the contracts b. Determination whether the contract qualifies for insurance accounting treatment or deposit accounting treatment (i.e., passes risk transfer), and understand impact on financial statements c. Commutations—definition, motivations of parties, and accounting and tax treatment
READINGS	
Blanchard Reinsurance FAS 113 Freihaut & Vendetti SSAP 62R Steeneck	

Complete Text References for Exam 6–United States

Text references are alphabetized by the citation column.

Citation	Abbreviation	Learning Objective	Source
2011 Insurance Expense Exhibit.	2011 IEE	C1	B/NEW
Actuarial Standards Board of the American Academy of Actuaries, “Actuarial Standard of Practice, No. 20, Discounting of Property/Casualty Unpaid Claim Estimates ,” September 2011.	ASOP 20	D1	OP NEW
Actuarial Standards Board of the American Academy of Actuaries, “Actuarial Standard of Practice No. 36, Statements of Actuarial Opinion Regarding Property/Casualty Loss and Loss Adjustment Expense Reserves,” December 2010.	ASOP 36	D1	OP
Actuarial Standards Board of the American Academy of Actuaries, “Actuarial Standard of Practice No. 41, Actuarial Communications,” December 2010.	ASOP 41	D1	OP
Actuarial Standards Board of the American Academy of Actuaries, “Actuarial Standard of Practice No. 43, Property/Casualty Unpaid Claim Estimates,” June 2007.	ASOP 43	D1	OP
A.M. Best, <i>Special Report: U.S. Surplus Lines—2007 Market Review</i> , August 25, 2008, Sections III through VI, pp. 20-33.	A.M. Best	A3	SK
American Academy of Actuaries Mass Tort Subcommittee, “Current Issues in Asbestos Litigation,” Issue Brief, February 2006.	Asbestos	A5	OP
American Academy of Actuaries, “Social Security Reform Options,” Public Policy Monograph, January 2007.	AAA Monograph	B1, B2, B3	OP
American Academy of Actuaries, Task Force on Materiality, “Materiality, Concepts on Professionalism,” Discussion Paper, Professionalism Series, 2006, No. 8.	AAA Materiality	D1	OP
Bartlett, D.K.; Klein, R.W.; and Russell, D.T., “Attempts to Socialize Insurance Costs in Voluntary Insurance Markets: The Historical Record,” <i>Journal of Insurance Regulation</i> , Summer 1999, pp. 478-487, up to Assessment Life Insurance.	Bartlett et al.	B2, B3	SK
Blanchard, R.S., “Basic Insurance Accounting—Selected Topics,” CAS Study Note, July 2008, pp. 21-24.	Blanchard Insurance	C3, C4	OP
Blanchard, R.S., “Basic Reinsurance Accounting—Selected Topics,” CAS Study Note, October 2010.	Blanchard Reinsurance	E1	OP

Citation	Abbreviation	Learning Objective	Source
Committee on Property and Liability Financial Reporting, American Academy of Actuaries, "Property and Casualty Practice Note, Statements of Actuarial Opinion on P&C Loss Reserves as of December 31, 2011."	COPLFR P&C Practice Note	D1	OP NEW
DeFrain, K., "The Impact of International Financial Reporting Standards on U.S. Actuarial Practice," CAS Study Note, November 5, 2010.	DeFrain	C3	OP
Feldblum, S., "Completing and Using Schedule P" (Eighth Edition), CAS Study Note, June 2003, excluding pp. 38–41 on IRIS ratios. Candidates are not responsible for the end notes.	Feldblum (Schedule P)	C1, D1	OP
Feldblum, S., "Computing Taxable Income for Property-Casualty Insurance Companies," CAS Study Note, 2007, pp. 1-13, excluding appendices and end notes.	Feldblum (Taxable Income)	C4	OP
Feldblum, S., "Discounting of Property-Casualty Loss Reserves," CAS Study Note, October 2011.	Feldblum (Discounting Note)	C1	OP NEW
Feldblum, S., "Federal Income Taxes and Investment Strategy," CAS Study Note, 2007, pp. 1–12, excluding Appendix and end notes.	Feldblum (Taxes and Investment Strategy)	C4	OP
Feldblum, S., "The Insurance Expense Exhibit and the Allocation of Investment Income" (Fifth Edition), CAS Study Note, May 1997, including October 2011 Addendum.	Feldblum (IEE)	C1	OP NEW
Feldblum, S., "IRS Loss Reserve Discounting," CAS Study Note, 2007. pp. 1–13, including errata, excluding Appendix and end notes.	Feldblum (Loss Reserve Discounting)	C4	OP
Feldblum, S., "NAIC Property/Casualty Insurance Company Risk-Based Capital Requirements," <i>PCAS LXXXIII</i> , 1996, pp. 297-359 (end at "Covariance Terms") and 379-413. Note that the candidate should review the exhibits on pp. 419-435 as they illustrate concepts, but questions will not be taken directly from these exhibits.	Feldblum (RBC)	A2, C2	OP
Feldblum, S., "Rating Agencies," CAS Study Note, October 3, 2011, pp. 1-7 and 14-19. Candidates are not responsible for Section 4, Appendices B-D, and the end notes.	Feldblum (Rating Agencies)	A3	OP NEW
Feldblum, S., "Reinsurance Accounting: Schedule F" (Eighth Edition), CAS Study Note, April 2003. Candidates are not responsible for the end notes.	Feldblum (Schedule F)	C1	OP
Feldblum, S., "Statutory Surplus: Computation, Pricing and Valuation," CAS Study Note, June 2003. Candidates are not responsible for the end notes.	Feldblum (Surplus)	C1	OP
Feldblum, S. and Blanchard, R.S., "Notes to the NAIC Property/Casualty Annual Statement," CAS Study Note, October 2010.	Feldblum and Blanchard	C1	OP

Citation	Abbreviation	Learning Objective	Source
Financial Accounting Standards Board, "Statement of Financial Accounting Standards, No. 113, Accounting and Reporting for Reinsurance of Short-Duration and Long-Duration Contracts," December 1992, Paragraphs 6-11, 14-18a, 21-22, 25, 28, 34-67, 70-74, 79-80, 82-85, and 94-109. Candidates are not responsible for material relating to long-duration contracts and/or life insurance.	FAS 113	E1	SK
Freihaut, D.; and Vendetti, P., "Common Pitfalls and Practical Considerations in Risk Transfer Analysis," <i>Casualty Actuarial Society E-Forum</i> , Spring 2009. (Appendices A and B are for information only and will not be directly tested.)	Freihaut & Vendetti	E1	OP
"GAO Report to the Chairman, Committee on Financial Services, House of Representatives, Risk Retention Groups, Common Regulatory Standards and Greater Member Protections are Needed," United States Government Accountability Office, GAO-05-536," August, 2005, pp. 8-14.	GAO Report	A3	OP
"Government Insurers Study Note," CAS Study Note, May 2008, pp. 6-13. Candidates are not responsible for numbers or statistics in charts.	Government Insurers Study Note	B1, B2, B3	OP
Hamilton, K.L.; and Ferguson, C.L., <i>Personal Risk Management and Property-Liability Insurance</i> (First Edition), American Institute for Chartered Property Casualty Underwriters, 2002, pp. 6.31-6.34 and 9.36-9.40.	Hamilton and Ferguson	B1, B2, B3	SK
Harrington, S.E., "Insurance Rate Regulation in the 20 th Century," <i>Journal of Insurance Regulation</i> , Winter 2000, pp. 204-217.	Harrington	A1, A4	SK
Insurance Accounting and Systems Association, <i>Property-Casualty Insurance Accounting</i> (Eighth Edition), 2003, Chapters 2, 5, 8, 9, 10, 14, and 15. Candidates are not responsible for items in the update to the 2003 Edition.	IASA	C1, C3	B
Kucera, J., "NAIC Public Hearing on Credit-Based Insurance Scores," April 30, 2009, American Academy of Actuaries.	Kucera	A1	OP
McCarty, K.M., "Testimony of Kevin M. McCarty, Florida Insurance Commissioner, Florida Office of Insurance Regulation and Representing the National Association of Insurance Commissioners, Regarding: 'The Impact of Credit-Based Insurance Scoring on the Availability and Affordability of Insurance,' May 21, 2008," Subcommittee on Oversight and Investigations of the House Committee on Financial Services, excluding Appendices 1 and 2.	McCarty	A1	OP
Miceli, T.J., <i>The Economic Approach to Law</i> , 2004, Stanford University Press, Chapter 2, Sections 3.7 and 3.8 (pp. 71-73).	Miceli	A5	SK
Musulin, R.T., "Issues in the Regulatory Acceptance of Computer Modeling for Property Insurance Ratemaking," <i>Journal of Insurance Regulation</i> , Spring 1997, pp. 342-359.	Musulin	A1, A3	SK

Citation	Abbreviation	Learning Objective	Source
National Association of Insurance Commissioners, <i>Accounting Practices and Procedures Manual</i> , 2011, Preamble.	NAIC APPM, Preamble	C3	SKU NEW
National Association of Insurance Commissioners, <i>Accounting Practices and Procedures Manual</i> , 2011, Statement of Statutory Accounting Principles 5R, “Liabilities, Contingencies, and Impairment of Assets,” paragraphs 1-11, 24-26, and 30-31.	NAIC SSAP 5R	C1	SKU NEW
National Association of Insurance Commissioners, <i>Accounting Practices and Procedures Manual</i> , 2011, Statement of Statutory Accounting Principles 9, “Subsequent Events” paragraphs 1-8.	NAIC SSAP 9	C1	SKU NEW
National Association of Insurance Commissioners, <i>Accounting Practices and Procedures Manual</i> , 2011, Statement of Statutory Accounting Principles 53, “Property Casualty Contracts—Premiums,” paragraphs 1-17.	NAIC SSAP 53	C1	SKU NEW
National Association of Insurance Commissioners, <i>Accounting Practices and Procedures Manual</i> , 2011, Statement of Statutory Accounting Principles 55, “Unpaid Claims, Loss and Loss Adjustment Expenses,” paragraphs 1-5 and 8-15.	NAIC SSAP 55	C1	SKU NEW
National Association of Insurance Commissioners, <i>Accounting Practices and Procedures Manual</i> , 2011, Statement of Statutory Accounting Principles 62R, “Property and Casualty Reinsurance,” paragraphs 1-86.	NAIC SSAP 62R	C1, E1	SKU NEW
National Association of Insurance Commissioners, <i>Accounting Practices and Procedures Manual</i> , 2011, Statement of Statutory Accounting Principles 65, “Property and Casualty Contracts,” paragraphs 1-45.	NAIC SSAP 65	C1	SKU NEW
National Association of Insurance Commissioners, “NAIC Insurance Regulatory Information System (IRIS) Ratios Manual,” 2011, Section II, Property/Casualty Ratios, pp. 5-26.	NAIC IRIS	A2, C2	SKU NEW
National Association of Insurance Commissioners, <i>Official 2011 NAIC Annual Statement Blanks, Property and Casualty</i> , (both individual and consolidated basis), pp. 2-13, Notes to the Financial Statement p. 14 (refer to the Feldblum and Blanchard paper for the Notes to cover); Schedules D (pp. SI03 through SI09), F (pp. 20-27), H (pp. 28-30), P (pp. 31-91). Candidates will be expected to have knowledge of other sections of the annual statement that are discussed in other <i>Syllabus</i> readings. Candidates are not responsible for page numbers. [The “Notes to the Financial Statement” are cited for reference only. Candidates are responsible for the Notes as described in the Feldblum and Blanchard reading where the Notes are referenced by title. If the 2011 Annual Statement and the study materials differ, candidates may base their answers on either.]	NAIC Annual Statement	C1	B NEW

Citation	Abbreviation	Learning Objective	Source
National Association of Insurance Commissioners Official Annual Statement Examples: The following companies post their annual statements online. Candidates should use these as illustrations to better understand the annual statement but are not responsible for any company-specific data: (1) Travelers (http://investor.travelers.com/phoenix.zhtml?c=177842&p=iro-l-reportsOther) and (2) the Liberty Mutual Group (http://www.libertymutualgroup.com/omapps/ContentServer?pagename=LMGroup/Views/LMG&ft=4&fid=1138356795162&ln=en).	NAIC Annual Statement Examples	C1	OP
National Association of Insurance Commissioners, " The United States Insurance Financial Solvency Framework ," 2010.	NAIC Solvency	A2	SKU/OP NEW
Nyce, C.M., <i>Foundations of Risk Management and Insurance</i> (Second Edition), 2006, American Institute for Chartered Property Casualty Underwriters, pp. 8.27–8.32	Nyce	B1, B2, B3	SK
Porter, K., <i>Insurance Regulation</i> , Insurance Institute of America, 2008, Chapters 2 (excluding 2.19–2.29), 3 (excluding 3.21–3.25), 4, 5, 6 (pp. 6.11–6.17), 8 (pp. 8.3–8.6), 11, and 12 (excluding pp. 12.12–12.17).	Porter 1	A1, A2, A3, A4	B
Porter, K., <i>Insurance Regulation</i> , Insurance Institute of America, 2008, Chapter 12 (pp. 12.12–12.17).	Porter 2	A2, B1, B2, B3	B
RAND Institute for Civil Justice, Research Brief RB-9037-ICJ, http://www.rand.org/pubs/research_briefs/RB9037/index1.html , 2002.	RAND	A5	OP
Schwartzman, J.; and Ross, G., "The Dodd-Frank Act and the insurance industry: Strategic considerations of U.S. financial reform," <i>insight</i> , Milliman, 27 September 2010.	Schwartzman and Ross	A3, A4	OP NEW
Steeneck, L., "Commutation of Claims," CAS Study Note, 1998. Candidates are only responsible for those sections related to Learning Objective E.1, which excludes pp. 5-14 on "Actuarial Consideration," but includes the Appendix. The remainder of the study note should be considered background material.	Steeneck	E1	OP
Vaughan, T.M., "The Implications of Solvency II for U.S. Insurance Regulation," Policy Brief, Networks Financial Institute at Indiana State University, 2009-PB-03, February 2009.	Vaughan	C3	SK
Wagner, T., "Insurance Rating Bureaus," <i>Journal of Insurance Regulation</i> , Winter 2000, pp. 189-202.	Wagner	A1, A4	SK
Wiening, E.A.; Rejda, G.E.; Luthardt, C.M.; and Ferguson, C.L.; <i>Personal Insurance</i> (First Edition), American Institute for Chartered Property Casualty Underwriters, 2002, pp. 10.25-10.32 and 12.26-12.33.	Wiening et al.	B1, B2, B3	SK

Citation	Abbreviation	Learning Objective	Source
Williams Brown, Orice, "Flood Insurance, Public Policy Goals Provide a Framework for Reform," United States Government Accountability Office, Testimony Before the Committee on Banking, Housing, and Urban Affairs, U.S. Senate, June 23, 2011, pp. 2-13.	Williams Brown	B1, B2, B3	OP NEW

Source Key

- B** Book—may be purchased from the publisher or bookstore or borrowed from the CAS Library.
- NEW** Indicates new or updated material.
- OP** Online publication—available at no charge and is linked from the text references section above.
- SK** Material included in the 2012 Study Kit.
- SKU** Material included in both the 2012 CAS Study Kit and the 2012 Update to the 2011 Study Kit.

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Actuarial Bookstore, P.O. Box 69, Greenland, NH 03840; telephone: (800) 582-9672 (U.S. only) or (603) 430-1252; fax: (603) 430-1258; Web site: www.actuarialbookstore.com.

Actuarial Digest, P.O. Box 1127, Ponte Vedra, FL 32004.

American Institute for Chartered Property Casualty Underwriters, Order Department, P.O. Box 3016, 720 Providence Road, Malvern, PA 19355-0716; telephone: (610) 644-2100; fax: (610) 640-9576.

Association Form of the Annual Statement Blanks, Bowne Insurance Services, 1717 Arch Street, 31st Floor, Philadelphia, PA 19103; telephone: (215) 988-5690 or (800) 234-6859.

Casualty Actuarial Society *E-Forum*, *Forum*, *Foundations of Casualty Actuarial Science* (Fourth Edition), *PCAS*, and *Discussion Paper Program*, 1100 N. Glebe Road, Suite 600, Arlington, VA 22201-4798; telephone: (703) 276-3100; fax: (703) 276-3108; e-mail: office@casact.org; Web site: www.casact.org.

Insurance Accounting and Systems Association, *Property-Casualty Insurance Accounting* (Eighth Edition), 2003, IASA Fulfillment Center, P.O. Box 51008, Durham, NC 27717; telephone: (800) 817-4272 or (919) 489-0991; fax: (800) 668-4272; Web site: www.iasa.org.

Insurance Expense Exhibit, Bowne Insurance Services, 1717 Arch Street, 31st Floor, Philadelphia, PA 19103; telephone: (215) 988-5690 or (800) 223-3103.

Insurance Institute of America, 720 Providence Road, Malvern, PA 19355-0770; telephone: (610) 644-2100.

Journal of Insurance Regulation, National Association of Insurance Commissioners, 120 W. 12th Street, #1100, Kansas City, MO 64105; telephone: (816) 842-3600.

Journal of Risk and Insurance, The, American Risk and Insurance Association, 716 Providence Road, P.O. Box 3028, Malvern, PA 19355; telephone: (610) 640-1997; fax: (610) 725-1007; Web site: www.aria.org.

NAIC Annual Statement Blanks, Property and Casualty may be obtained from Bowne Insurance Services, 1717 Arch Street, 31st Floor, Philadelphia, PA 19103; telephone: (215) 988-5690 or (800) 223-3103.

National Association of Insurance Commissioners, 120 W. 12th Street, #1100, Kansas City, MO 64105; telephone: (816) 842-3600.

RAND Institute for Civil Justice, 1700 Main Street, P.O. Box 2138, Santa Monica, CA 90407-2138, Web Site: www.rand.org.

RR Donnelley, Two Logan Square, 18th Floor, Philadelphia, PA 19103; telephone: (215) 988-5622 or (800) 234-6859 [for the *NAIC Annual Statement Blanks, Property and Casualty* and the Insurance Expense Exhibit (P&C)].

Stanford University Press, 1450 Page Mill Road, Palo Alto, CA, 94304; telephone (800) 621-2736; Web site: www.sup.org.

2012 Exam 7

Estimation of Policy Liabilities, Insurance Company Valuation, and Enterprise Risk Management

The syllabus for this four-hour exam is defined in the form of learning objectives, knowledge statements, and readings.

LEARNING OBJECTIVES set forth, usually in broad terms, what the candidate should be able to do in actual practice. Included in these learning objectives are certain methodologies that may not be possible to perform on an examination, such as complex simulations, but that the candidate would still be expected to explain conceptually in the context of an examination.

KNOWLEDGE STATEMENTS identify some of the key terms, concepts, and methods that are associated with each learning objective. These knowledge statements are not intended to represent an exhaustive list of topics that may be tested, but they are illustrative of the scope of each learning objective.

READINGS support the learning objectives. It is intended that the readings, in conjunction with the material on the lower numbered examinations, provide sufficient resources to allow the candidate to perform the learning objectives. Some readings are cited for more than one learning objective. The Syllabus and Examination Committees emphasize that candidates are expected to use the readings cited in this Syllabus as their primary study materials.

Thus, the learning objectives, knowledge statements, and readings complement each other. The learning objectives define the behaviors, the knowledge statements illustrate more fully the intended scope of the learning objectives, and the readings provide the source material to achieve the learning objectives. Learning objectives should not be seen as independent units, but as building blocks for the understanding and integration of important competencies that the candidate will be able to demonstrate.

Note that the range of weights shown should be viewed as a guideline only. There is no intent that they be strictly adhered to on any given examination—the actual weight may fall outside the published range on any particular examination.

The overall section weights should be viewed as having more significance than the weights for the individual learning objectives. Over a number of years of examinations, absent changes, it is likely that the average of the weights for each individual overall section will be in the vicinity of the guideline weight. For the weights of individual learning objectives, such convergence is less likely. On a given examination, in which it is very possible that not every individual learning objective will be tested, there will be more divergence of guideline weights and actual weights. Questions on a given learning objective may be drawn from any of the listed readings, or a combination of the readings. There may be no questions from one or more readings on a particular exam.

After each set of learning objectives, the readings are listed in abbreviated form. Complete text references are provided at the end of this exam syllabus.

Items marked with a bold **SK** constitute the 2012 CAS Exam 7 Study Kit that may be purchased from the CAS Online Store. Items marked with a bold **OP** (Online Publication) are available at no charge and may be downloaded from links in the Complete Text References section below.

Please check the “Syllabus Update” for this exam for any changes to this syllabus.

A. Estimation of Policy Liabilities

Range of weight for Section A: 40–50 percent

This section focuses on advanced techniques that the actuary may need to estimate reserves for unpaid claims. The candidate is expected to be well versed in the basic Principles and Standards of Practice for unpaid claim estimation. This section addresses how actuarial concepts are adapted to evaluate liabilities arising in complex risk transfer agreements common in excess insurance and reinsurance contracts. Emphasis is placed on developing ranges around a best estimate.

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
1. Calculate unpaid claim estimates using credibility models. Range of weight: 2–4 percent	a. Application of credibility b. Mechanics of the method c. Strengths and weaknesses d. Testing results for reasonableness
READINGS	
Brosius Mack (2000)	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
2. Estimate parameters and unpaid claims using claims development models related to loss reserving methods such as: <ul style="list-style-type: none"> • Chain ladder • Cape Cod • Chain ladder plus calendar-year effects • Bornhuetter-Ferguson 3. Calculate the moments and percentiles of unpaid claim distributions implied by the models. Range of weight: 16-18 percent	a. Key assumptions of the models and testing of assumptions b. Original Mack chain ladder assumptions c. Relationship of variance assumptions to methods of calculating development factors d. Row-factor times column-factor models e. Calendar-year effects in development factor models and in row-column factor models f. Effect of trends and their interrelationship (e.g., calendar year, accident year, and development year trends) g. Testing for and eliminating insignificant parameters h. Testing whether the methods work and how well the models fit i. Moments of the chain ladder unpaid claim estimate when factors are calculated based on different variance assumptions j. Simulation of parameter percentiles and unpaid claims percentiles when models assume a distribution of residuals fit by MLE
READINGS	
Clark Mack (1994) Venter	

EARNING OBJECTIVES	KNOWLEDGE STATEMENTS
<p>4. Estimate unpaid claims for various layers of claims. Range of weight: 1–3 percent</p>	<p>a. Methods for estimating unpaid claims in a deductible layer b. Methods for estimating unlimited unpaid claims excess of a threshold c. Methods for estimating unpaid claims excess of a retention but bounded by a limit d. Interrelationships between parameters for forecasting deductible, unlimited excess, layer excess and total claims</p>
READINGS	
Siewert	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
<p>5. Calculate the mean and prediction error of a reserve given an underlying statistical model. Range of weight: for Learning Objectives A5-A7 collectively: 7-9 percent</p>	<p>a. Distributions and distribution-free models b. Comparison of Chain Ladder stochastic models</p>
<p>6. Derive predictive distributions using bootstrapping and simulation techniques. Range of weight: for Learning Objectives A5-A7 collectively: 7-9 percent</p>	<p>a. Comparison of methods b. Simulation using bootstrapping c. Simulation from parameters d. Bayesian methods</p>
<p>7. Adjust stochastic reserving models for changes in underlying reserve assumptions Range of weight: for Learning Objectives A5-A7 collectively: 7-9 percent</p>	<p>a. Bayesian methods b. Apply adjustments to various reserving techniques</p>
READINGS	
England and Verrall Verrall	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
<p>8. Compare and contrast reinsurance and primary reserving procedures. 9. Adjust primary methods and data to be used for reinsurance reserving. 10. Calculate ceded loss reserves using appropriate methods. Range of weight: 12–14 percent</p>	<p>a. Overview of reinsurance and primary reserving methods b. Impact on assumptions from differences in information available to reinsurers c. Stanard-Buhlmann method d. Cape Cod method e. Underlying business characteristics of reinsurance contracts e.g., concentration of exposures f. Data structures: <ul style="list-style-type: none"> • Ground up versus excess loss • Accident year versus treaty year g. Reinsurance reserving methods</p>
READINGS	
Patrik	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
11. Forecast Premium Reserves. Range of weight: 2-4 percent	a. Reserves for retrospective premiums b. Reserves for unearned premiums for policies with non pro-rata earning patterns
READINGS	
Teng and Perkins	

B. Insurance Company Valuation

Range of weight for Section B: 5–7 percent

This section focuses on methods used to determine the theoretical value of equity securities and extending the methodology to value property and casualty insurance companies. The candidate is expected to be proficient with the basic tools and techniques commonly used in the financial analysis of corporations as described in the knowledge requirements set forth for VEE–Corporate Finance.

Learning Objectives	Knowledge Statements
1. Calculate the effect of loss and expense reserve requirements and regulatory or rating agency capital requirements on the free cash flow to equity for a P&C insurer. Range of weight for Learning Objectives B1-B3 collectively: 5-7 percent	a. Free cash flow to equity for a P&C insurer
2. Value the equity of a P&C insurer based on its expected future dividends, its free cash flow to equity, or its expected abnormal earnings Range of weight for Learning Objectives B1-B3 collectively: 5-7 percent	a. Dividend Discount Model (DDM) b. Free cash flow to equity for a P&C insurer c. Discounted Cash Flow (DCF) Valuation using free cash flow to equity (FCFE), including impact of alternative methods of estimating terminal values and reasons why this method is preferred over the free cash flow to the firm (FCFF) method for P&C insurers d. Abnormal earnings e. Abnormal Earnings Valuation (AE), including impact of alternative methods of estimating terminal values
3. Value the equity of a firm using comparative or relative valuation methods based on multiples of selected financial variables obtained from either peer companies or from underlying fundamentals. Range of weight for Learning Objectives B1-B3 collectively: 5-7 percent	a. Comparative valuation ratios including price-earnings, price-sales, price-book, price-cash flow b. Relationship between the dividend discount model and the price-earnings (P-E) ratio c. Relationship between the abnormal earnings valuation model and the price-book value (P-BV) ratio
READINGS	
Goldfarb	

C. Enterprise Risk Management

Range of weight for Section C: 45-55 percent

This section introduces the candidate to the concepts and basic techniques of Enterprise Risk Management (ERM). ERM seeks to integrate the entire landscape of risk that confronts a business. Topics include value of risk management and basic modeling concepts.

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
1. Demonstrate how insurance and financial risk can be analyzed quantitatively. Range of weight: 10-14 percent	a. Currency risk b. Credit risk c. Spread risk d. Interest rate risk e. Equity risk f. Hazard/insurance risk
READINGS	
Brooks et al. IAA Venter Financial	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
2. Describe the use of enterprise-wide risk modeling and aggregation techniques. 3. Evaluate and select appropriate models to handle diverse risks, including stochastic approaches. Range of weight: 10-14 percent	a. Incorporating the use of correlation b. Evaluation and selection of appropriate copulas as part of the process of modeling multi-variate risks c. Alternatives to copulas d. Scenario analysis e. Stress testing f. Extreme value theory g. Tail distributions and tail correlations h. Low frequency/high severity events i. Model and parameter risk
READINGS	
Brooks et al. Embrechts et al. Feldblum IAA Venter Copulas	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
4. Demonstrate the properties of various risk measures and their limitations. 5. Describe how risk measures and risk modeling, including allocation, can affect strategic management. Range of weight: 5-8 percent	a. (Semi) standard deviation b. VaR and TVaR c. Expected policyholder deficit and default put option d. Risk-adjusted TVaR e. Distortion measures and probability transforms
READINGS	
IAA Venter and Underwood Venter Non-tail Measures Venter Strategic Management	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
6. Describe the rationale for, methods for, and effect of managing insurance and financial risks. Range of weight: 8-12 percent	a. Selection of appropriate degree of risk b. Risk optimization and value impact c. Retention including estimated costs compared to benefits of risk transfer, value of specific risk, costs of financial distress, taxation, firm value, financing costs, and risk attitudes of debtholders, customers, employees, etc.
READINGS	
IAA Venter and Underwood	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
7. Describe operational risk and demonstrate possible mitigation and quantification methodology. Range of weight: 3-5 percent	a. Types of operational risk b. Examples c. Quantification d. Mitigation
READINGS	
Mango and Venter McNeil et al.	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
8. Evaluate best practices in risk measurement, modeling, and management of various financial and non-financial risks faced by an entity. Range of weight: 5-8 percent	a. Economic capital b. Extreme events c. Risks d. Model structure
READINGS	
Brooks et al.	

Complete Text References for Exam 7

Text references are alphabetized by the citation column.

Citation	Abbreviation	Learning Objective	Source
Brooks, D.; Care, R.J.; Chaplin, M.B.; Kaufman, A.M.; Morgan, K.A.; and Roberts, D.N., "Actuarial Aspects of Internal Models for Solvency II," draft paper presented to the Institute of Actuaries, 23 February 2009, Chapters 1, 4, 9, and 14-28.	Brooks et al.	C1, C2, C3, C8	OP
Brosius, E., "Loss Development Using Credibility," CAS Study Note, March 1993.	Brosius	A1	OP
Clark, D.R., "LDF Curve Fitting and Stochastic Reserving: A Maximum Likelihood Approach," <i>Casualty Actuarial Society Forum</i> , Fall 2003.	Clark	A2, A3	OP

Citation	Abbreviation	Learning Objective	Source
Embrechts, P.; Resnick, S.I.; and Samorodnitsky, G., "Extreme Value Theory as a Risk Management Tool," <i>North American Actuarial Journal</i> , Volume 3, Number 2, April 1999, Society of Actuaries.	Embrechts et al.	C2, C3	OP
England, P.D., and Verrall, R.J., "Stochastic Claims Reserving in General Insurance," Institute of Actuaries and Faculty of Actuaries, 28 January 2002.	England and Verrall	A5, A6, A7	OP
Feldblum, S., "Dependency Modeling," CAS Study Note, September 2010.	Feldblum	C2, C3	OP
Goldfarb, R. "P&C Insurance Company Valuation," CAS Study Note, October 2010.	Goldfarb	B1, B2, B3	OP
International Actuarial Association, "A Global Framework for Insurer Solvency Assessment," a research report of the Insurer Solvency Assessment Working Party, 2004, Chapters 1, 2, 5, 7, 8, and 9; Appendices B, D, E, H, and I.	IAA	C1, C2, C4, C5, C6	OP
Mack, T., "Measuring the Variability of Chain Ladder Reserve Estimates," <i>Casualty Actuarial Society Forum</i> , Spring 1994.	Mack (1994)	A2, A3	OP
Mack, T. "Credible Claims Reserve: The Benktander Method," <i>ASTIN Bulletin</i> , 2000, pp. 333-337.	Mack (2000)	A1	OP
Mango, D.F.; and Venter, G.G., "Operational Risk," <i>Enterprise Risk Analysis for Property & Liability Insurance Companies</i> , Brehm, P.; Gluck, S.; Kreps, R.; Major, J.; Mango, D.; Shaw, R.; Venter, G.; White, S.; and Witcraft, S., Guy Carpenter, Section 4.1.	Mango and Venter	C7	SK
McNeil, A.J.; Frey, R.; and Embrechts, P., <i>Quantitative Risk Management</i> , Princeton University Press, 2005, Section 10.1, "Operational Risk in Perspective," pp. 463-470, excluding "Notes and Comments" on page 470.	McNeil et al.	C7	SK
Patrik, G.S., "Reinsurance," <i>Foundations of Casualty Actuarial Science</i> (Fourth Edition), Casualty Actuarial Society, 2001, Chapter 7, pp. 434-464 (section on Reinsurance Loss Reserving).	Patrik	A8, A9, A10	OP
Siewert, J.J., "A Model for Reserving Workers Compensation High Deductibles," <i>Casualty Actuarial Society Forum</i> , Summer 1996, pp. 217-244.	Siewert	A4	OP
Teng, M.T.S.; and Perkins, M.E., "Estimating the Premium Asset on Retrospectively Rated Policies," <i>PCAS LXXXIII</i> , 1996, pp. 611-647, excluding Section 5. Including discussion of paper: Feldblum, S., <i>PCAS LXXXV</i> , 1998, pp. 274-315, Sections 1 and 2 only. Candidates will not be held responsible for specific Annual Statement notation but will be responsible for concepts presented.	Teng and Perkins	A11	OP

Citation	Abbreviation	Learning Objective	Source
Venter, G.G., "Advances in Modeling of Financial Series," Society of Actuaries, 2010.	Venter Financial	C1	OP
Venter, G.G., "ERM for Strategic Management—Status Report," Society of Actuaries, 2008.	Venter Strategic Management	C4	OP
Venter, G.G., "Non-tail Measures and Allocation of Risk Measures," CAS Study Note, 1/11/2010.	Venter Non-tail Measures	C4	OP
Venter, G.G., "Tails of Copulas," <i>PCAS LXXXIX</i> , 2002, pp. 68-113.	Venter Copulas	C2	OP
Venter, G.G., "Testing the Assumptions of Age-to-Age Factors," <i>PCAS LXXXV</i> , 1998, pp. 807-847.	Venter Factors	A2, A3	OP
Venter, G.G.; and Underwood, A., "Value of Risk Reduction," CAS Study Note, 2010.	Venter and Underwood	C5, C6	OP
Verrall, R.J., "Obtaining Predictive Distributions for Reserves Which Incorporate Expert Opinion," <i>Variance</i> , Vol. 1, Issue 1, 2007, Casualty Actuarial Society.	Verrall	A5, A6,A7	OP

Source Key

OP Online publication—available at no charge and is linked from the text references section above.

SK Material included in the 2012 CAS Study Kit.

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Institute and Faculty of Actuaries, Staple Inn Hall, High Holborn, London WC1V 7QJ, United Kingdom; telephone: +44 (0)20 7632 2111; Web site: www.actuaries.org.uk.

International Actuarial Association, 150 Metcalfe Street, Suite 800, Ottawa, Ontario K2P 1P1, Canada; telephone: (613) 236-0886; fax: (613) 236-1386; Web site: www.actuaries.org.

McNeil, A.J.; Frey, R.; and Embrechts, P., *Quantitative Risk Management*, 2005, Princeton University Press, 41 William Street, Princeton, NJ 08540; telephone: (609) 258-4900; fax: (609) 258-6305; Web site: http://press.princeton.edu/.

North American Actuarial Journal, Society of Actuaries, 475 N. Martingale Road, Suite 600, Schaumburg, IL 60173; telephone: 847.706.3500; Web site: www.soa.org.

SlideRule Books, P.O. Box 69, Greenland, NH 03840; telephone: (877) 407-5433 or (605) 845-5580; fax: (877) 417-5433 or (605) 845-7627; Web site: www.sliderulebooks.com.

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Archives 2012

2012 Exam 8 Syllabus Advanced Ratemaking

The syllabus for this **four**-hour exam is defined in the form of learning objectives, knowledge statements, and readings.

LEARNING OBJECTIVES set forth, usually in broad terms, what the candidate should be able to do in actual practice. Included in these learning objectives are certain methodologies that may not be possible to perform on an examination, such as complex simulations, but that the candidate would still be expected to explain conceptually in the context of an examination.

KNOWLEDGE STATEMENTS identify some of the key terms, concepts, and methods that are associated with each learning objective. These knowledge statements are not intended to represent an exhaustive list of topics that may be tested, but they are illustrative of the scope of each learning objective.

READINGS support the learning objectives. It is intended that the readings, in conjunction with the material on the lower numbered examinations, provide sufficient resources to allow the candidate to perform the learning objectives. Some readings are cited for more than one learning objective. The Syllabus and Examination Committees emphasize that candidates are expected to use the readings cited in this *Syllabus* as their primary study materials.

Thus, the learning objectives, knowledge statements, and readings complement each other. The learning objectives define the behaviors, the knowledge statements illustrate more fully the intended scope of the learning objectives, and the readings provide the source material to achieve the learning objectives. Learning objectives should not be seen as independent units, but as building blocks for the understanding and integration of important competencies that the candidate will be able to demonstrate.

Note that the range of weights shown should be viewed as a guideline only. There is no intent that they be strictly adhered to on any given examination—the actual weight may fall outside the published range on any particular examination.

The overall section weights should be viewed as having more significance than the weights for the individual learning objectives. Over a number of years of examinations, absent changes, it is likely that the average of the weights for each individual overall section will be in the vicinity of the guideline weight. For the weights of individual learning objectives, such convergence is less likely. On a given examination, in which it is very possible that not every individual learning objective will be tested, there will be more divergence of guideline weights and actual weights. Questions on a given learning objective may be drawn from any of the listed readings, or a combination of the readings. There may be no questions from one or more readings on a particular exam.

After each set of learning objectives, the readings are listed in abbreviated form. Complete text references are provided at the end of this exam syllabus.

Items marked with a bold **SK** constitute the 2012 CAS Exam 8 Study Kit that may be purchased from the CAS Online Store. Items marked with a bold **OP** (Online Publication) are available at no charge and may be downloaded from links in the Complete Text References section below.

Please check the “*Syllabus Updates*” section of the CAS Web Site for any changes to the *Syllabus*.

Candidates for Exam 8 are expected to have already acquired considerable technical knowledge and practical experience in insurance ratemaking. Therefore, this examination will assume a working knowledge of basic ratemaking and will deal with advanced topics. To some degree, the examination will deal with the types of practical problems that a fully qualified actuary, working in ratemaking,

should be able to solve. The ability to apply ratemaking knowledge and experience may be tested through questions dealing with problems for which there are no generally recognized solutions.

The readings for Exam 8 should be studied for illustration of basic principles and theories, as well as for insight into advanced ratemaking problems and their solutions.

A. Classification Ratemaking

Range of weight for Section A: 20-30 percent

In this exam, classification ratemaking and rate filings, which were introduced earlier in the syllabus, are treated in greater depth. The material in this section provides tools that enable the practitioner to go beyond mechanical construction to the comparison and evaluation of alternative classification schemes.

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
1. Identify and evaluate possible rate classes. Range of weight: 5-10 percent	a. Characteristics of appropriate classifications b. Sampling techniques c. Credibility considerations d. Statistical significance e. Cluster analysis
READINGS	
AAA Bailey & Simon Mahler 1 Robertson	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
2. Measure statistical significance of possible classes and estimate the loss costs of rating classes. Range of weight: 5-10 percent	a. Multidimensional relativities b. Credibility techniques c. Quintiles Test d. Holdout sample
READINGS	
Bailey & Simon Courret & Venter	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
3. Formularize and solve generalized linear models (GLMs) for classification ratemaking. Range of weight: 5-10 percent	a. GLM assumptions compared to: <ul style="list-style-type: none"> • One-way analysis • Minimum bias procedures • Classical linear analysis b. Components of a GLM formula c. Aliasing and near-aliasing
READINGS	
Anderson et al.	

B. Excess, Deductible, and Individual Risk Rating

Range of weight for Section B: 50-70 percent

One of the important functions performed by an actuary is rating individual risks. Prior to Exam 8, most of the readings addressed group or classification risk rating. This section is intended to prepare candidates to design and manage excess, deductible, and individual risk rating systems.

The readings range from those that discuss the theoretical foundation of excess, deductible, and individual risk rating, to those that discuss the application of specific rating plans. Candidates are expected to apply these concepts in a creative and problem-solving manner.

The first subsection covers pricing for layers of loss including excess and deductible business while the following subsections cover individual risk rating consisting of:

1. Experience rating, in which prior individual risk experience is used to adjust rates prospectively.
2. Retrospective and loss sensitive rating, in which the insured will pay an amount (in premium or retained loss) that depends on the experience after the policy has been written.

Candidates are also expected to be knowledgeable in the application of individual risk rating plans currently in use. Excerpts from the NCCI *Experience Rating Plan Manual for Workers Compensation and Employers Liability Insurance*, NCCI *Retrospective Rating Plan Manual for Workers Compensation and Employers Liability Insurance*, and ISO *Commercial General Liability Experience and Schedule Rating Plan* will be provided with the examination. Candidates are not required to memorize the details, but will be expected to be able to use the details of these plans during the examination. Since the necessary excerpts will be included with the examination, candidates will not be allowed to bring copies of the documents into the examination room.

Excess and Deductible Rating

Excess and deductible rating allows the insured to retain the risk of loss and loss expenses up to limits selected in advance.

This section builds on the material covered in the basic ratemaking section of Exam 5. Candidates should have a general knowledge and understanding of excess coverages and the problems inherent in pricing these coverages for different lines of business.

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
1. Apply frequency and severity distributions to determine expected losses by layer of insurance. Range of weight: 8-12 percent	a. Severity distributions and their uses, including increased limits factors (ILFs) and loss elimination ratios (LERs) b. Properties of ILFs and LERs c. Interaction among inflation, changes in layer, and losses d. Methods of estimating frequency and severity distributions from losses
READINGS	
Gillam & Snader 1 Lee 1 Mahler 2 Miccolis	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
2. Estimate aggregate loss distributions. Range of weight: 8-12 percent	a. Techniques to estimate aggregate loss distributions directly from aggregate data (e.g., Table M, Table L) b. Construction of an aggregate loss distribution from frequency and severity distributions
READINGS	
Brosius Gillam & Snader 2 Lee 2 Mahler 3 Skurnick	

Experience Rating

The primary goal of experience rating is the adjustment of an individual risk's rate to reflect the extent to which that risk's own experience identifies it as being different from other risks in the same class. The readings begin with principles and concepts, and then move to a discussion of plans in current use.

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
3. Adjust class rates based on individual risk experience and exposure. Range of weight: 8-12 percent	a. Actuarial principles and concepts underlying the development of experience rating plans b. Credibility concepts (e.g., maximum single loss) c. Current NCCI and ISO experience rating plans d. Schedule rating
READINGS	
Gillam Gillam & Snader 1 ISO NCCI 1 NCCI 2 Venter	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
4. Assess effectiveness of experience rating plans. Range of weight: 5-10 percent	a. Off-balance factors b. Evaluation techniques (e.g., quintile test)
READINGS	
Gillam Venter	

Retrospective and Loss Sensitive Rating

Retrospective rating allows adjustment of individual risk premium after policy expiration in response to actual loss and expenses associated with the policy. The retrospective rating plans currently in use adjust the premium up or down within limits selected in advance.

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
5. Construct a retrospectively rated plan. Range of weight: 8-12 percent	a. Actuarial principles and concepts underlying the construction of a retrospective rating plan (e.g., balance principle, construction of table of insurance charges) b. NCCI retrospective rating plans
READINGS	
Brosius Gillam & Snader 2 Lee 2 NCCI 3 Skurnick	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
6. Analyze the elements of a loss sensitive rating plan. Range of weight: 8-12 percent	a. Influence of the parameters and other elements of the plan on the final price and potential profitability of product b. Influence of the parameters and other elements of the plan on cost and cash flow to insured
READINGS	
Fisher Gillam & Snader 2 Lee 2 Skurnick	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
7. Calculate the cost of the layer of risk given the loss cost. Range of weight: 4-6 percent	a. Variability of expenses by layer and policy provisions b. Large dollar deductible (LDD) and excess policy provisions c. Advantages of LDD and excess policies
READINGS	
Fisher Gillam & Snader 3 Teng	

C. Catastrophic and Reinsurance Pricing

Range of weight for Section C: 15-20 percent

Catastrophe Ratemaking

This subsection introduces candidates to the methods used to model losses due to catastrophic events for the purpose of generating a catastrophe risk load and to manage the total exposure from catastrophic events within an insurance portfolio.

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
1. Describe the components and structure of catastrophe models.	<ul style="list-style-type: none"> a. Hazard, exposure, vulnerability and loss modules b. Exceedance Probability Curve c. Simulation and modeling techniques
2. Explain the use of catastrophe models in insurance ratemaking and portfolio management. Range of weight for Learning Objectives C.1 and C.2 collectively: 4-6 percent	<ul style="list-style-type: none"> a. Insurability of catastrophe risks b. Sources and nature of uncertainty in catastrophe modeling c. Use of catastrophe models in insurance ratemaking d. Use of catastrophe models in portfolio management
READING	
Grossi & Kunreuther	

Reinsurance Ratemaking

This subsection introduces candidates to current and historical methods used to price reinsurance. The candidates will be familiar with many of these methods from the materials on primary insurance ratemaking; the emphasis here is on the application of these methods in pricing reinsurance contracts.

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
3. Determine the price of various types of reinsurance contracts. Range of weight: 3-5 percent	<ul style="list-style-type: none"> a. Types of contracts, including excess of loss, quota share, surplus share, treaty, aggregate excess of loss, and facultative b. Common methods for pricing reinsurance, including burn cost, exposure rating and experience rating c. Reinsurance loss development and trend d. Use of increased limit factors in reinsurance pricing e. Evaluation of aggregate distribution models f. Prospective and retrospective pricing in reinsurance
4. Determine the effect of common contract provision on the price of reinsurance contracts. Range of weight: 3-5 percent	<ul style="list-style-type: none"> a. Pricing for reinstatements, loss corridors, clash, profit and sliding scale commissions, and other common provisions in reinsurance contracts
5. Specify, fit, and use loss distribution based exposure curves. Range of weight: 3-5 percent	<ul style="list-style-type: none"> a. Define an exposure curve b. Limited and unlimited distributions c. Expected value and total loss probability d. Use of MBBEFD class distributions as exposure curves
READING	
Clark Bernegger	

Complete Text References for Exam 8

Text references are alphabetized by the citation column.

Citation	Abbreviation	Learning Objective	Source
American Academy of Actuaries Committee on Risk Classification, "Risk Classification Statement of Principles," June 1980. [Available at no charge from the American Academy of Actuaries at (202) 223-8196 or on the Academy's Web Site at www.actuary.org.]	AAA	A1	OP
Anderson, D.; Feldblum, S; Modlin, C; Schirmacher, D.; Schirmacher, E.; and Thandi, N., "A Practitioner's Guide to Generalized Linear Models" (Third Edition), CAS Study Note, February 2007, pp. 4-39 only. [Note: the study note edition is a revised version of a paper from the <i>CAS Discussion Paper Program</i> . Candidates must use the study note edition.]	Anderson et al.	A3	OP
Bailey, R.A.; and Simon, L.J., "An Actuarial Note on the Credibility of Experience of a Single Private Passenger Car," <i>PCAS XLVI</i> , 1959, pp. 159-164. Including discussion of paper: Hazam, W.J., <i>PCAS XLVII</i> , 1960, pp. 150-152.	Bailey & Simon	A1-A2	OP
Bernegger, S., "Swiss Re Exposure Curves and the MBBEFD Distribution Class," <i>ASTIN Bulletin</i> , Vol. 27, No. 1, May 1997, pp. 99-111.	Bernegger	C3, C5	OP
Brosius, J.E., "Table M Construction," CAS Study Note, 2002.	Brosius	B2, B5	OP
Clark, D.R., "Basics of Reinsurance Pricing," CAS Study Note, 1996. Candidates are not responsible for Section 6 of the paper.	Clark	C3, C4	OP
Couret, J.; and Venter, G., "Using Multi-Dimensional Credibility to Estimate Class Frequency Vectors in Workers Compensation," <i>ASTIN Bulletin</i> , Vol. 38, No. 1, May 2008, pp. 72-85.	Couret & Venter	A2	OP
Fisher, G.K., "Pricing Aggregates on Deductible Policies," CAS Study Note, May 2002.	Fisher	B6, B7	OP
Gillam, W.R., "Workers' Compensation Experience Rating: What Every Actuary Should Know," <i>PCAS LXXIX</i> , 1992, Sections 1-5, pp. 215-239.	Gillam	B3, B4	OP
Gillam, W.R.; and Snader, R.H., "Fundamentals of Individual Risk Rating," National Council on Compensation Insurance (Study Note), 1992, Part I.	Gillam & Snader 1	B1, B3	OP
Gillam, W.R.; and Snader, R.H., "Fundamentals of Individual Risk Rating," National Council on Compensation Insurance (Study Note), 1992, Part II.	Gillam & Snader 2	B2, B5, B6	OP
Gillam, W.R.; and Snader, R.H., "Fundamentals of Individual Risk Rating," National Council on Compensation Insurance (Study Note), 1992, Part III.	Gillam & Snader 3	B7	OP
Grossi, P.; and Kunreuther, H., Editors, <i>Catastrophe Modeling: A New Approach to Managing Risk</i> , 2005, Springer, Chapters 2-6 (excluding references at the end of each chapter).	Grossi & Kunreuther	C1, C2	B

Citation	Abbreviation	Learning Objective	Source
Insurance Services Office, Inc., <i>Commercial General Liability Experience and Schedule Rating Plan</i> , 2006. Excerpts from the ISO <i>Commercial General Liability Experience and Schedule Rating Plan</i> will be provided with the exam. Candidates are not required to memorize the details, but will be expected to be able to use them on the exam. Since they will be included with the exam, candidates will not be allowed to bring copies of the documents into the examination room.	ISO	B3	SK
Lee, Y.S., “The Mathematics of Excess of Loss Coverages and Retrospective Rating—A Graphical Approach,” Sections 1-3, <i>PCAS LXXV</i> , 1988, pp. 49-64.	Lee 1	B1	OP
Lee, Y.S., “The Mathematics of Excess of Loss Coverage and Retrospective Rating—A Graphical Approach,” Section 4, <i>PCAS LXXV</i> , 1988, pp. 64-78. Candidates are not responsible for “Other Applications” on pp. 75-76.	Lee 2	B2, B5, B6	OP
Mahler, H.C., “An Example of Credibility and Shifting Risk Parameters,” <i>PCAS LXXVII</i> , 1990, pp. 225-282. Candidates will not be tested on the Appendices.	Mahler 1	A1	OP
Mahler, H.C., Discussion of “Retrospective Rating: 1997 Excess Loss Factors,” <i>PCAS LXXXV</i> , 1998, pp. 316-344. Appendices B-D are for reference only; candidates do not need to memorize formulas in Appendices B-D. Including Errata.	Mahler 2	B1	OP
Mahler, H.C., “Workers Compensation Excess Ratios: An Alternative Method of Estimation,” <i>PCAS LXXXV</i> , 1998, pp. 132-156.	Mahler 3	B2	OP
Miccolis, R.S., “On the Theory of Increased Limits and Excess of Loss Pricing,” <i>PCAS LXIV</i> , 1977, pp. 27-59 excluding “Risk Reduction by Layering” (pp. 45-49). Including discussion of paper: Rosenberg, S., <i>PCAS LXIV</i> , 1977, pp. 60-73.	Miccolis	B1	OP
National Council on Compensation Insurance, <i>The 1998 Adjustment to the Experience Rating Plan: Your Guide to Understanding the Changes</i> .	NCCI 1	B3	SK
National Council on Compensation Insurance, <i>Experience Rating Plan Manual for Workers Compensation and Employers Liability Insurance</i> . Candidates are responsible for only the excerpted material included in the Study Kit. Candidates are not required to memorize the details, but will be expected to be able to use them on the examination. Since the required excerpts will be included with the examination, candidates will not be allowed to bring copies of the documents into the examination room.	NCCI 2	B3	SK

Citation	Abbreviation	Learning Objective	Source
National Council on Compensation Insurance, <i>Retrospective Rating Plan Manual for Workers Compensation and Employers Liability Insurance</i> . Candidates are responsible for only the excerpted material included in the Study Kit, excluding Part 2, Section III, on cancellation provisions. Candidates are not required to memorize the details, but will be expected to be able to use them on the examination. Since the required excerpts will be included with the examination, candidates will not be allowed to bring copies of the documents into the examination room.	NCCI 3	B5	SK
Robertson, J.P., “NCCI’s 2007 Hazard Group Mapping,” <i>Variance</i> , Vol. 3, Issue 2, 2009, Casualty Actuarial Society, pp. 194-213.	Robertson	A1	OP
Skurnick, D., “The California Table L,” <i>PCAS LXI</i> , 1974, pp. 117-140. Including discussion of this paper: Gillam, W.R., <i>PCAS LXXX</i> , 1993, pp. 353-365.	Skurnick	B2, B6	OP
Teng, M.T.S., “Pricing Workers’ Compensation Large Deductible and Excess Insurance,” <i>Casualty Actuarial Society Forum</i> , Winter 1994, pp. 413-437.	Teng	B7	OP
Venter, G.G., “Experience Rating—Equity and Predictive Accuracy,” <i>NCCI Digest</i> , April 1987, Volume II, Issue I, pp. 27-35. (Pages are shown as 1-9 in the Study Kit version.)	Venter	B3, B4	SK

Source Key

- B** Book—may be purchased from the publisher or bookstore or borrowed from the CAS Library.
- OP** Online publication—available at no charge and is linked from the text references section above.
- SK** Material included in the 2012 CAS Study Kit.

Items printed in **red** indicate an update or change.

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Casualty Actuarial Society *Forum*, *PCAS*, and *Discussion Paper Program*, Casualty Actuarial Society, 4350 N. Fairfax Drive, Suite 250, Arlington, VA 22203; telephone: (703) 276-3100; fax: (703) 276-3108; e-mail: office@casact.org; Web site: www.casact.org.

Insurance Services Office, Inc., 545 Washington Boulevard, Jersey City, NJ 07310-1686; telephone: (800) 888-4476.

National Council on Compensation Insurance, 901 Peninsula Corporate Circle, Boca Raton, FL 33487; telephone: (800) NCCI-123.

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2012 Exam 9

Financial Risk and Rate of Return

The syllabus for this **four**-hour exam is defined in the form of learning objectives, knowledge statements, and readings.

LEARNING OBJECTIVES set forth, usually in broad terms, what the candidate should be able to do in actual practice. Included in these learning objectives are certain methodologies that may not be possible to perform on an examination, such as complex simulations, but that the candidate would still be expected to explain conceptually in the context of an examination.

KNOWLEDGE STATEMENTS identify some of the key terms, concepts, and methods that are associated with each learning objective. These knowledge statements are not intended to represent an exhaustive list of topics that may be tested, but they are illustrative of the scope of each learning objective.

READINGS support the learning objectives. It is intended that the readings, in conjunction with the material on the lower numbered examinations, provide sufficient resources to allow the candidate to perform the learning objectives. Some readings are cited for more than one learning objective. The Syllabus and Examination Committees emphasize that candidates are expected to use the readings cited in this *Syllabus* as their primary study materials.

Thus, the learning objectives, knowledge statements, and readings complement each other. The learning objectives define the behaviors, the knowledge statements illustrate more fully the intended scope of the learning objectives, and the readings provide the source material to achieve the learning objectives. Learning objectives should not be seen as independent units, but as building blocks for the understanding and integration of important competencies that the candidate will be able to demonstrate.

Note that the range of weights shown should be viewed as a guideline only. There is no intent that they be strictly adhered to on any given examination—the actual weight may fall outside the published range on any particular examination.

The overall section weights should be viewed as having more significance than the weights for the individual learning objectives. Over a number of years of examinations, absent changes, it is likely that the average of the weights for each individual overall section will be in the vicinity of the guideline weight. For the weights of individual learning objectives, such convergence is less likely. On a given examination, in which it is very possible that not every individual learning objective will be tested, there will be more divergence of guideline weights and actual weights. Questions on a given learning objective may be drawn from any of the listed readings, or a combination of the readings. There may be no questions from one or more readings on a particular exam.

After each set of learning objectives, the readings are listed in abbreviated form. Complete text references are provided at the end of this exam syllabus.

Items marked with a bold **SK** constitute the 2012 CAS Exam 9 Study Kit that may be purchased from the CAS Online Store. Items marked with a bold **OP** (Online Publication) are available at no charge and may be downloaded from links in the Complete Text References section below. Books and other publications marked with a bold **B** may be purchased from the publisher or a bookstore (with limited copies available to be borrowed from the CAS Library).

Please check the “Syllabus Update” for this exam for any changes to this syllabus.

Exam 9 focuses on a broad array of finance, investment, and financial risk management topics. This examination assumes a working knowledge of basic ratemaking, finance, probability and statistical modeling, liability and reserve risk, and insurance underwriting. The ability to apply this knowledge

and experience may be tested through questions dealing with problems for which there are no generally recognized solutions.

TEXTS FOR THIS EXAM

There are two main texts: *Investments* (Ninth Edition) by Bodie, Kane, and Marcus and *Options, Futures and Other Derivatives* (Eighth Edition) by Hull. *Investments* contains references to various Web sites. Candidates are not responsible for the identity of the Web sites or the actual content of the Web sites except to the extent that the content is reproduced in the text. Candidates are also not responsible for any aspect of the Excel applications or the boxes entitled “E-Investments” that are usually placed at or towards the end of a chapter.

While, in general, it is suggested that the candidate cover the learning objectives in the order listed, some references to later chapters in texts may occur before references to earlier chapters. In these cases, the candidate may need to review the earlier chapters first and then return to the learning objectives that reference the later chapters.

For the Financial Risk and Rate of Return exam, the appendices are part of the material covered unless specifically excluded.

There are various numeric tables scattered throughout the readings, illustrating actual observations or hypothetical examples. Candidates are not responsible for the actual numeric values.

BACKGROUND

Candidates may find it helpful to review Chapters 1-5 of *Investments* for background in financial markets and instruments as well as the Venter paper for background on liquidity risk.

A. Portfolio Theory and Equilibrium in Capital Markets

Range of weight for Section A: 13-17 percent

The portfolio theory portion of this section discusses the relationship between the risk and return for different combinations of risky and risk-free investments and discusses the effect of diversification on this relationship. Candidates are introduced to the manner in which investors might select a particular portfolio, from those available, that best suits their individual preferences for risk and return. In the portion of this section on equilibrium in capital markets, various equilibrium models are presented, including the Capital Asset Pricing Model (CAPM) and Arbitrage Pricing Theory (APT). The concept of market efficiency is presented to help candidates understand the factors that move market prices towards and away from the theoretical prices presented in these models.

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
1. Explain key concepts of risk: <ul style="list-style-type: none"> • Appetite • Tolerance • Aversion • Measurement • Portfolio construction • Strategies for monitoring Range of weight: 0-5 percent	a. Utility functions, utility scores, and utility maximization b. Risk aversion c. Mean-variance criterion d. Capital allocation line e. Complete portfolio f. Reward to variability ratio (Sharpe ratio)
READINGS	
BKM, Chapter 6	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
2. Calculate the expected value, variance, and covariance of returns of asset portfolios in a multi-dimensional setting. Range of weight: 3-7 percent	a. Expected return and standard deviation for portfolios of risky and risk-free assets b. Optimal risky portfolio c. Optimal complete portfolio
3. Describe arguments why a passive strategy for selecting a portfolio of risky assets may be a reasonable choice for many investors and the key steps in the Markowitz Portfolio Selection Model. Range of weight: 3-7 percent	a. Passive versus active strategies: costs of active strategy and free-rider benefit b. Minimum variance frontier c. Efficient frontier of risky assets d. Optimal capital allocation line e. Separation property f. Asset allocation versus security selection
4. Explain and demonstrate effects of various diversification strategies. Range of weight: 0-5 percent	a. Systematic risk b. Risk pooling c. Risk sharing d. Insurance principle
READINGS	
BKM, Chapter 7	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
5. Explain and use the single factor models and compare/contrast the process of portfolio construction with the full covariance (Markowitz) model. Range of weight: 3-7 percent	a. Markowitz model b. Single factor model c. Single index model d. Systematic risk e. Alpha, Beta estimating and forecasting f. Covariance and correlation estimates for single index model g. Risk premiums due to market and non-market factors h. Parameter estimation risk i. Macroeconomic factors
READINGS	
BKM, Chapter 8	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
6. Explain the assumptions and construction of CAPM and use CAPM to calculate expected returns for risky securities. Range of weight: 3-7 percent	a. CAPM assumptions b. Market price of risk c. Capital market line d. Security market line e. Extensions of CAPM <ul style="list-style-type: none"> • Zero Beta CAPM • CAPM with non-traded assets and labor income • ICAPM • CAPM with liquidity adjustments
7. Compare/contrast CAPM and single index model and explain the assumptions that are modified under various extensions of CAPM. Range of weight: 0-5 percent	a. CAPM b. Single index model c. Expected versus actual returns d. Market portfolio versus market index

READINGS
BKM, Chapter 9

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
8. Use APT to determine the expected return for a security and compare/contrast with CAPM and factor models. Range of weight: 0-5 percent	a. Arbitrage and the Law of One Price b. APT and its comparison to CAPM c. Factor betas d. Factor portfolios and factor risk premiums e. Alternative factors in multifactor models

READINGS
BKM, Chapter 10

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
9. Explain market efficiency and its implications for portfolio management, and describe the various tests and studies of market efficiency. Range of weight: 3-7 percent	a. Efficient market hypothesis b. Random walk c. Technical analysis d. Fundamental analysis e. Passive investment strategy f. Portfolio management

READINGS
BKM, Chapter 11

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
10. Explain the influence of behavioral finance in understanding certain aspects of market efficiency. Range of weight: 0-5 percent	a. Information processing errors b. Behavioral biases c. Limits to arbitrage d. Violations of Law of One Price e. Behavioral critique f. Technical analysis

READINGS
BKM, Chapter 12

B. Asset-Liability Management

Range of weight for Section B: 13-17 percent

This section exposes the candidate to factors that influence the price sensitivity of fixed income securities and presents various ways in which a portfolio manager might manage the interest rate and cash flow risk in a portfolio of these instruments. The same concepts are also applied to the interest rate risk associated with a firm's liabilities and the interest rate risk associated with a firm's total market value, inclusive of their franchise value.

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
1. Explain the different Term Structure Theories. Range of weight: 0-5 percent	a. Expectations hypothesis b. Liquidity preference theory c. Segmentation theory d. Forward rate versus expected spot rate

2. Determine U.S. Treasury zero rates at different maturities. Range of weight: 3-7 percent	<ul style="list-style-type: none"> a. Bootstrap method for determining zero rates from coupon bonds using both continuous and semi-annual compounding b. Determining forward rates from spot rates (zero rates) c. Spot rates d. Short rates e. LIBOR zero rates f. Forward Rate Agreements
READINGS	
BKM, Chapter 15 Hull, Chapter 4	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
3. Utilize various strategies to manage interest rate risk and cash flow risk in a bond portfolio. Range of weight: 3-7 percent	<ul style="list-style-type: none"> a. Duration (Macaulay, modified, and effective) b. Convexity c. The effect of interest changes on bond prices d. Immunization e. Cash flow matching and dedication f. Contingent immunization g. Rebalancing h. Use of interest rate swaps, mortgage-backed securities, and other derivative securities to alter the interest rate risk for a bond portfolio
READINGS	
BKM, Chapter 16 Hull, Sections 4.8 and 4.9, and Chapter 7	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
4. Calculate the Macaulay duration of loss reserves and the Macaulay duration of the surplus of a property and casualty (P&C) insurance company. Range of weight: 0-5 percent	<ul style="list-style-type: none"> a. Macaulay duration b. Relationship between surplus, asset, and liability durations
READINGS	
Feldblum Asset Noris (excluding Sections I, II, V, and VI)	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
5. Quantify franchise value, evaluate the impact of interest rate sensitivity, and demonstrate how interest rate sensitivity of the franchise value can be managed. Range of weight: 0-5 percent	<ul style="list-style-type: none"> a. Total economic value b. Franchise value—magnitude and exposure to interest rate risk (duration) c. Pricing strategy d. Advantages of managing the interest rate sensitivity of the firm's total economic value through pricing strategy
READINGS	
Panning	

C. Financial Risk Management

Range of weight for Section C: 25-30 percent

This section addresses financial risks as well as risks related to the insurance industry from the financial economics perspective. The concepts and techniques presented in this section are important components in the field of enterprise risk management.

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
1. Estimate the credit risk due to default and default correlation associated with fixed income securities. Range of weight: 3-7 percent	a. Default intensity or hazard rate b. Unconditional default probability c. Expected loss from default d. Yield spread e. Recovery rate f. Relationship between asset volatility and equity volatility. g. Merton's model h. Credit ratings transition matrix i. Use of Gaussian copula to simulate correlated ratings transitions for two bonds j. <i>CreditMetrics</i> approach to estimating credit value at risk
2. Describe the credit risk in derivatives transactions and various mechanisms to manage the risk. Range of weight: 0-5 percent	a. Counterparty default risk b. Netting c. Collateralization d. Downgrade triggers
READINGS	
Hull, Chapter 23	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
3. Describe the reasons for the development of credit derivatives market, the valuation of credit derivative contracts, and the complexity of trading credit risks. Range of weight: 3-7 percent	a. Credit default swaps (CDS) b. Mark-to-market c. Asset-backed securities (ABS) d. Collateralized debt obligation (CDO) and synthetic CDO e. The role CDS played in the 2008 financial crisis
READINGS	
Coval, Jurek, and Stafford Hull, Chapter 24 (24.1-24.9)	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
4. Describe liquidity risk and various mechanisms to manage the risk. Range of weight: 3-7 percent	a. Liquidity risk b. Sources of liquidity risk c. Risk reduction techniques d. Lessons from the recent economic crises
READINGS	
Academy Basel: Liquidity Risk Basel: Principles Venter (for background only)	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
5. Discuss the development and the complexity of financial engineering products such as mortgage-backed securities and other forms of securitization. Range of weight: 0-5 percent	a. Effect of securitization on sources of funds for mortgage holders and on interest rate risk retained by the mortgage originators b. Mortgage pass-throughs and the effect of mortgage prepayment on cash flows to investors c. Collateralized mortgage obligations (CMOs) and the effect of prepayments on cash flows to investors in particular tranches d. Market liquidity and credit rating e. Lessons from the recent subprime crisis
6. Describe the market for securitizing catastrophe risk in the insurance industry and explain the reasons for its growth. Range of weight: 0-5 percent	a. Products on the market: <ul style="list-style-type: none"> • Risk-linked securities • CAT bonds • Sidcars • Cat-E-puts • Catastrophe risk swaps • Industry loss warranties b. Factors influencing interest in insurance securitization in relation to traditional reinsurance c. Factors impeding the growth of the market: <ul style="list-style-type: none"> • Regulatory • Accounting • Tax • Rating issues
READINGS	
BKM, Chapters 1 (pp. 17-18), 2 (pp. 39-41), and 16 (Section 16.2) Coval, Jurek, and Stafford Cummins CAT Bond	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
<p>7. Describe various risk measures and the need for practicing sound financial risk management.</p> <p>Range of weight: 3-7 percent</p>	<p>a. Capital structure and risk taking incentives</p> <p>b. Regulation and rating agency</p> <p>c. Limitations of VaR</p> <p>d. Cash flow at risk</p> <p>e. Shortfall risk</p> <p>f. Risk-based capital</p> <p>g. Expected policyholder deficit (EPD)</p> <p>h. Capital associated with a constant EPD ratio</p> <p>i. Risk-adjusted return on capital (RAROC), including alternative measures of income and alternative measures of risk-adjusted capital</p> <p>j. EVA</p>
<p>8. Benefits of Risk Management</p> <p>Range of weight: 0-5 percent</p>	<p>a. Friction Costs, including agency costs and double taxation</p> <p>b. Lessons from past failures due to poor financial risk management</p>
READINGS	
<p>Butsic Culp, Miller and Neves (excluding Appendix) Cummins Capital Goldfarb Stulz</p>	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
<p>9. Describe the concept of economic capital (or risk capital) in the insurance industry and various methods of allocating the risk capital to business units or lines of business.</p> <p>Range of weight: 3-7 percent</p>	<p>a. Financial and insurance risks</p> <p>b. Economic capital or risk capital</p> <p>c. Risk aggregation</p> <p>d. Strengths and weaknesses of the various allocation methods using risk measures such as:</p> <ul style="list-style-type: none"> • Percentile (VaR) • CTE • EPD Ratio • Merton-Perold method • Insolvency Put/EPD ratio risk measure • Myers-Read method • Co-Measures • Co-CTE
<p>10. Apply the RAROC framework to risk management in the insurance industry.</p> <p>Range of weight: 3-7percent</p>	<p>a. Economic profit as income measure</p> <p>b. Cost of capital</p> <p>c. RAROC</p> <p>d. Additional risk margin in price</p> <p>e. Multi-period capital commitment</p>

11. Assess the performance of business units and set prices for insurance policies on a risk-adjusted basis. Range of weight: 3-7percent	a. Economic profit as income measure b. Cost of capital c. RAROC d. Additional risk margin in price e. Multi-period capital commitment
READINGS	
Cummins Capital Goldfarb	

D. Rate of Return, Risk Loads, and Contingency Provision

Range of weight for Section D: 35-40 percent

This section explores the relationship between insurance concepts (such as underwriting profits, premium-to-surplus ratios, and investment income) and financial concepts (such as interest rates, inflation rates, cost of capital, and risk premiums). The readings build on a background of finance as related to the insurance business, and deal with specific techniques used by actuaries to develop an appropriate profit loading in insurance prices.

Because insurance claims are fortuitous, the expected profit loaded in rates may not be realized. The models discussed in Learning Objectives 1 and 2 assume that insured events are predictable in time and amount. Learning Objective 3 addresses the consideration required when insured events are uncertain, particularly where capacity is limited and/or sufficient diversification of exposure is impossible.

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
1. Analyze rate of return. Range of weight: 10-15 percent	a. Composition of surplus b. Measures of return including ROE, underwriting profit, Internal Rate of Return (IRR) <ul style="list-style-type: none"> • Advantages • Disadvantages • Perspectives of users c. Sources and types of data used for analysis including calendar year versus accident year
2. Estimate a rate in order to achieve a target rate of return. Range of weight: 10-15 percent	a. Composition of surplus b. Measures of return (including ROE, underwriting profit, and IRR) c. Sources and types of data used for analysis including calendar year versus accident year
READINGS	
Feldblum Financial Ferrari McClenahan Robbin Roth	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
3. Determine risk load and contingency provision to be included in insurance rates. Range of weight: 10-15 percent	a. Theory underlying the risk load b. Purpose of a risk load c. Relationship between risk load and variability
READINGS	
Bault Feldblum Financial Ferrari Kreps Mango Roth	

Complete Text References for Exam 9

Text references are alphabetized by the citation column.

Citations	Abbreviation	Learning Objective	Source
American Academy of Actuaries, "Report of the Life Liquidity Work Group of the American Academy of Actuaries to the NAIC's Life Liquidity Working Group," December 2, 2000, pp. 1-9 (up to but excluding "Possible Sources of Liquidity Risk: Embedded Liquidity Options"), 12 (last paragraph) – 16 (first paragraph).	Academy	C4	OP
Basel Committee on Banking Supervision, "Liquidity Risk: Management and Supervisory Challenges," Bank for International Settlements, February 2008, Sections 1-4.	Basel: Liquidity Risk	C4	OP
Basel Committee on Banking Supervision, "Principles for Sound Liquidity Risk Management and Supervision," Bank for International Settlements, September 2008, Principles 5-7 (pp. 10-20) and Principles 9-10 (pp. 23-27).	Basel: Principles	C4	OP
Bault, T., "Discussion of Feldblum: 'Risk Load for Insurers,'" <i>PCAS LXXII</i> , 1995, pp. 78-96. Candidates may wish to review the following articles as background to the above, although no questions will be directly drawn from them: Feldblum, S., "Risk Loads for Insurers," <i>PCAS LXXVII</i> , 1990, pp. 160-195, including discussions of paper: Philbrick, S.W., <i>PCAS LXXVIII</i> , 1991, pp. 56-63.	Bault	D3	OP
Bodie, Z.; Kane, A.; and Marcus, A.J., <i>Investments</i> (Ninth Edition), McGraw-Hill/Irwin, 2011. Chapter or section citations are listed under the appropriate learning objective.	BKM	A1-A10, B1-B3, C5-C6	B
Butsic, R.P., "Solvency Measurement for Property-Liability Risk-Based Capital Applications," <i>The Journal of Risk and Insurance</i> , Volume 61, No. 4 (December 1994), pp. 656-690.	Butsic	C7-C8	SK

Citations	Abbreviation	Learning Objective	Source
Coval, J.; Jurek, J.; and Stafford, E., "The Economics of Structured Finance," <i>Journal of Economic Perspectives</i> , American Economic Association, Volume 23, Number 1, Winter 2009.	Coval, Jurek, and Stafford	C3, C5	SK
Culp, C.L.; Miller, M.H.; and Neves, A.M.P., "Value at Risk: Uses and Abuses," <i>The New Corporate Finance: Where Theory Meets Practice</i> (Third Edition), Chew, D.H., editor; McGraw-Hill/Irwin, 2001, Chapter 33, pp. 462-471.	Culp, Miller, and Neves	C7-C8	SK
Cummins, J. D., "Allocation of Capital in the Insurance Industry," <i>Risk Management and Insurance Review</i> , American Risk and Insurance Association, Inc., Spring 2000, Vol. 3, No. 1, pp. 7-27.	Cummins Capital	C7-C11	SK
Cummins, J. D., "CAT Bond and Other Risk-Linked Securities: State of the Market and Recent Developments," <i>Risk Management and Insurance Review</i> , American Risk and Insurance Association, Inc., 2008, Vol. 11, No. 1, pp. 23-47.	Cummins CAT Bond	C5-C6	SK
Feldblum, S., "Asset Liability Matching For Property/Casualty Insurers," <i>Valuation Issues, CAS Special Interest Seminar</i> , 1989, pp. 117-154.	Feldblum Asset	B4	OP
Feldblum, S., "Pricing Insurance Policies: The Internal Rate of Return Model," CAS Study Note, May 1992. Only Sections 1, 3, and 6 will be directly tested, but the other sections may provide useful background.	Feldblum Financial	D1-D3	OP
Ferrari, J.R., "The Relationship of Underwriting, Investment, Leverage, and Exposure to Total Return on Owners' Equity," <i>PCAS LV</i> , 1968, pp. 295-302. Includes discussion: Balcarek, R.J., <i>PCAS LVI</i> , 1969, pp. 58-60.	Ferrari	D1-D3	OP
Goldfarb, R. "Risk-Adjusted Performance Measurement for P&C Insurers," October 2010.	Goldfarb	C7-C11	OP
Hull, J.C., <i>Options, Futures, and Other Derivatives</i> (Eighth Edition), Prentice Hall, 2012. Chapter or section citations are listed under the appropriate learning objective.	Hull	B1-B3, C1-C3	B
Kreps, R.E., "Investment-Equivalent Reinsurance Pricing," <i>Actuarial Considerations Regarding Risk and Return In Property-Casualty Insurance Pricing</i> , Casualty Actuarial Society, 1999, Chapter 6, excluding Section IV; including Errata.	Kreps	D3	OP
Mango, D.F., "An Application of Game Theory: Property Catastrophe Risk Load," <i>PCAS LXXXV</i> , 1998, pp. 157-186. Exam questions will not be drawn from Section 9.	Mango	D3	OP
McClenahan, C.L., "Insurance Profitability," <i>Actuarial Considerations Regarding Risk and Return in Property-Casualty Insurance Pricing</i> , Casualty Actuarial Society, 1999, Chapter 8.	McClenahan	D1-D2	OP

Citations	Abbreviation	Learning Objective	Source
Noris, P.D., "Asset/Liability Management Strategies for Property and Casualty Companies," Morgan Stanley, May 1985.	Noris	B4	SK
Panning, W.H., "Managing Interest Rate Risk: ALM, Franchise Value, and Strategy," Willis Re Working Paper, July 2006.	Panning	B5	OP
Robbin, Ira, "The Underwriting Profit Provision," CAS Study Note, as updated in 1992.	Robbin	D1-D2	OP
Roth, R., "Analysis of Surplus and Rate of Return Without Using Leverage Ratios," <i>Insurer Financial Solvency, Casualty Actuarial Society Discussion Paper Program</i> , 1992, Volume I, pp. 439-464.	Roth	D1-D3	OP
Stulz, R.M., "Rethinking Risk Management," <i>The New Corporate Finance: Where Theory Meets Practice</i> (Third Edition), Chew, D.H., editor; McGraw-Hill/Irwin, 2001, Chapter 29, pp. 411-427.	Stulz	C7-C8	SK
Venter, G., "Modeling and Managing Liquidity Risk," Society of Actuaries, for background only.	Venter	C4	OP

Source Key

- B** Book—may be purchased from the publisher or bookstore or borrowed from the CAS Library.
- OP** Online publication—available at no charge and is linked from the text references section above.
- SK** Material included in the 2012 CAS Study Kit.

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American Academy of Actuaries, 1850 M Street, NW, Suite 300, Washington, DC 20036; telephone: (202) 223.8196; fax 202.872.1948; Web site: www.actuary.org.

American Risk and Insurance Association, 716 Providence Road, Malvern, PA 19355; telephone: (610) 640-1997; Web site: aria@cpuiia.org.

Basel Committee on Banking Supervision, Bank for International Settlements, Centralbahnplatz 2, CH-4002, Basel, Switzerland, telephone: (+41 61) 280 8080; Web site: www.bis.org.

Bodie, Z.; Kane, A.; and Marcus, A.J., *Investments* (Ninth Edition), 2011, McGraw-Hill/Irwin, 860 Taylor Station Road, Blacklick, OH 43004; telephone: (800) 262-4729.

Casualty Actuarial Society *E-Forum, Forum, PCAS, and Discussion Paper Program*, Casualty Actuarial Society, 4350 N. Fairfax Drive, Suite 250, Arlington, VA 22203; telephone: (703) 276-3100; fax: (703) 276-3108; e-mail: office@casact.org; Web site: www.casact.org.

Chew, D.H., editor, *The New Corporate Finance: Where Theory Meets Practice* (Third Edition), 2001, McGraw-Hill/Irwin, 860 Taylor Station Road, Blacklick, OH 43004; telephone: (800) 262-4729.

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