Society of Actuaries

Fall 2001

Basic Education Catalog

MISCELLANEOUS INFORMATION

- All Applications and order forms can be found in the back of this catalog or on our Web site, www.soa.org. Requests may also be sent via e-mail to pgarrity@soa.org, or by calling the SOA office at 847-706-3515.
- Please refer to our Web site for any future updates to course information.

The following list of acronyms will be found in this catalog:

AAA	American Academy of Actuaries
APC	Associateship Professionalism Course
ASA	Associate of the Society of Actuaries
ASB	Actuarial Standards Board
ASPA	American Society of Pension Actuaries
BOG	Board of Governors—Society of Actuaries
CAS	Casualty Actuarial Society
CCA	Conference of Consulting Actuaries
CIA	Canadian Institute of Actuaries
CLU	Chartered Life Underwriter
CMA	Chartered Management Accountant
CPCU	Chartered Property/Casualty Underwriter
EA	Enrolled Actuary
EA-1	Enrolled Actuaries Basic Examination
EA-2, A	Enrolled Actuaries Pension Examination, Segment A
EA-2, B	Enrolled Actuaries Pension Examination, Segment B
E&E	Education and Examination
FAC	Fellowship Admissions Course
FASB	Financial Accounting Standards Board
FSA	Fellow of the Society of Actuaries
NAAJ	*North American Actuarial Journal*
PCCA	*Proceedings*, Conference of Consulting Actuaries
PCIA	*Proceedings*, Canadian Institute of Actuaries
PD	Professional Development
RSA	*Record*, Society of Actuaries
SN	Study Note
SOA	Society of Actuaries
TSA	*Transactions*, Society of Actuaries
TSA Reports	*Transactions*, *Reports of Mortality and Morbidity Experience*, Society of Actuaries

TABLE OF CONTENTS

THE SOCIETY OF ACTUARIES

Mission and Vision Statement of the Society of Actuaries

The Society of Actuaries (SOA) is an educational, research, and professional organization dedicated to serving the public and Society members. Its mission is to advance actuarial knowledge and to enhance the ability of actuaries to provide expert advice and relevant solutions for financial, business, and societal problems involving uncertain future events. The vision of the SOA is for actuaries to be recognized as the leading professionals in the modeling and management of financial risk and contingent events.

Terms and concepts used in the Mission and Vision Statement may be amplified as follows:

1. **Education Organization**

   The SOA provides basic education in the fundamental principles of actuarial science, advanced education and professional development in areas requiring specific technical or regulatory knowledge, and continuing education for practicing actuaries.

2. **Research Organization**

   The SOA conducts research to develop studies of historical experience and techniques for projections into the future, to analyze the actuarial aspects of public policy issues, and to provide the foundation for further expansion of the profession.

3. **Professional Organization**

   The SOA promotes high standards of professional competence and conduct within the actuarial profession. The SOA has adopted a Code of Professional Conduct, and in matters of conduct and discipline, it cooperates with the Canadian Institute of Actuaries and with the American Academy of Actuaries, including the Actuarial Standards Board and the Actuarial Board for Counseling and Discipline.

4. **Serving the Public**

   By developing and valuing financial programs, actuaries provide service to the public. In addition to looking after the interests of direct participants and beneficiaries of such public and private programs, actuaries also provide advice to shareholders, regulators, financial analysts and others. The SOA meets its responsibility to the various publics by recruiting and educating actuaries and by its role as a professional organization. Note that the SOA places serving the public ahead of serving its members.

5. **Serving its Members**

   The SOA is committed to meeting the needs of its members. Members work in the traditional practice areas of life insurance, retirement systems, health benefit systems, financial and investment management, and in emerging practice areas. In meeting the needs of its members, the SOA conducts meetings and seminars, publishes papers and studies, makes or sponsors investigations, promotes educational activities for candidates and members, utilizes technology to enhance communications, sponsors academics and supports universities with actuarial science programs, organizes special interest sections, and undertakes such other activities as appropriate. However, in accomplishing many of these tasks, the SOA relies on the generous support of its members in volunteer roles.

   Although the majority of the SOA members reside in Canada or in the U.S., a significant number of members live or practice in other geographical areas. The SOA is committed to encouraging the development of actuarial science worldwide and to addressing the international needs of SOA members. The SOA is a member of the International Actuarial Association and of the worldwide actuarial profession.

6. **Advancing Actuarial Knowledge and Enhancing the Ability of Actuaries**

   Knowledge of actuarial science is the foundation of the actuarial profession. Actuaries often deal with problems relating to uncertain future events. With insurance based on scientific actuarial principles, financial aspects of uncertainties such as premature death, disability, need for medical care, etc., can be exchanged for the certainty of a premium payment. Pension and social security programs require actuarial analysis based on contingencies such as period of employment, covered earnings, and mortality. Investments and other financial transactions involving risk or uncertainty can also be modeled using actuarial techniques. In a dynamic and rapidly changing world, actuarial knowledge must be continuously expanded to meet increasingly complex problems and to enhance the value added by actuarial analysis.

7. **Recognition as the Leading Professionals**

The vision of the SOA is not only to have actuaries be the leading professionals in the modeling and management of financial risk and contingent events, but to have this expertise widely recognized and accepted outside the actuarial profession as well.

8. **Critical Success Factors**

Critical success factors for the profession and the SOA are:

For the Profession

- Be relevant to the needs of our customers. Provide value to a large enough constituency to sustain meaningful work for current and future members of the profession. This may mean expanding our horizons as a profession.
- Be recognized and credible with employers, clients, policymakers and the public by clearly defining who we are and how we differ from others.
- Expand the scope of the actuarial profession. Design a paradigm that expands the scope of meaningful applications of our science, while preserving its integrity and uniqueness.
- Have an effective influence on public policy.
- Focus on maintaining quality membership by recruiting, educating and retaining people who are a credit to the profession, the customers and the societies we serve.
- Be forward looking, flexible and adaptable. Where appropriate, motivate the need for actuarial services in the absence of government regulations. Focus our professional resources on outcomes most important to members and the public.

For the SOA

- Provide a relevant educational system to train new actuaries and provide continuing education for actuaries. Keep Education and Examinations (E&E) and Continuing Education systems in line with the profession's needs.
- Carry out research initiatives that maintain a current knowledge base and expand it so that we can add value to our customers; publications should support dissemination of the knowledge base; knowledge base needs to support both new and existing practice areas.
- Provide appropriate scope for actuarial practice, encompassing attention to the new practice areas and appropriate geographical areas, and building and maintaining employment opportunities for actuaries. Focus should continue to be on customer needs.
- Provide and maintain strong and effective services for members. The key is helping members add value to their customers with emphasis on external focus.
- Maintain a strong volunteer system and effectively support it with staff.
- Provide support to help achieve the critical success factors for the profession.
- Prepare for the future, focusing on both the long and the short term.

  The critical success factors should serve as a framework for testing priorities and allocating resources.

Principles Underlying the Education and Examination (E&E) System

The SOA administers a series of courses leading to Associateship and Fellowship. The principles underlying the SOA E&E system are the following:

1. To provide the actuary with an understanding of fundamental mathematical concepts and how they are applied, with recognition of the dynamic nature of these fundamental concepts in that the actuary must remain up-to-date with developments in mathematics and statistics;
2. To provide the actuary with an accurate picture of the sociodemographic, political, legal, and economic environments within which financial arrangements operate, along with an understanding of the changing nature and potential future directions of these environments;
3. To expose the actuary to a broad range of techniques that the actuary can recognize and identify as to their application and as to their inherent limitations, with appropriate new techniques introduced into this range as they are developed;
4. To expose the actuary to a broad range of relevant actuarial practice, including current and potential application of mathematical concepts and techniques to the various and specialized areas of actuarial practice; and
5. To develop the actuary's sense of inquisitiveness so as to encourage exploration into areas where traditional methods and practice do not appear to work effectively.

Current Admission Requirements to the SOA

Associateship

A. Who may be admitted

Anyone pursuing actuarial studies may apply for admission to the SOA. If the Board of Governors (BOG) approves the Application for Admission as Associate, the candidate will be enrolled as an Associate of the Society of Actuaries (ASA) after completing the Associateship educational requirements prescribed by the BOG, subject to any further requirements that the BOG may prescribe. Membership dues are not charged until the Application is accepted and all requirements prescribed by the BOG have been satisfied.

B. When and how to apply

A candidate planning to seek admission to the SOA should submit the Application for Admission as Associate before completing the educational requirements for Associateship. The Application for Admission as Associate is separate from the candidate's course registration application and will be sent to candidates who have passed Courses 1–4. Courses 1–4 are the same as CAS Exams 1–4. Any questions regarding the application should be directed to the Membership Coordinator at 847-706-3532.

C. Associateship Requirements

To attain Associateship, the candidate must successfully complete courses 1–6 and the Associateship Professionalism Course (APC), and must have the Application For Admission as an Associate approved by the SOA Board of Governors. These requirements became effective January 1, 2000. Any candidate who was not an Associate as of January 1, 2000 is subject to these requirements.

Credit for all courses must be obtained by examinations offered by the SOA or by an alternative method approved by the BOG. In certain circumstances, course credit may be obtained by waiver for a candidate who has the examination credits in another actuarial organization.

Fellowship

A. Who may be admitted

An Associate will be admitted as a Fellow of the Society of Actuaries (FSA) after completing the Fellowship educational requirements, including the Professional Development (PD) requirement, the Fellowship Admissions Course (FAC), and any additional requirements prescribed by the BOG. No application is required for an Associate to be admitted as a Fellow.

B. Fellowship Requirements

Fellowship examination requirements include successfully completing Course 7 and Course 8 (where candidates must choose one of six practice-specific examinations). The FAC is required of all candidates for Fellowship, and candidates may not attend the FAC until they have completed Courses 1–8 and the PD requirement.

COURSE LISTINGS

Requirements for Associateship		
Course	**Title**	**Offered**
Course 1**	Mathematical Foundations of Actuarial Science	Spring & Fall
Course 2**	Interest Theory, Economics and Finance	Spring & Fall
Course 3**	Actuarial Models	Spring & Fall
Course 4**	Actuarial Modeling	Spring & Fall
Course 5	Application of Basic Actuarial Principles	Fall
Course 6	Finance and Investments	Spring
Associateship Professionalism Course		
Requirements for Fellowship (in addition to the Associateship designation)		
Course	**Title**	**Offered**
Course 7	Applied Modeling	Various
Course 8	Advanced Specialized Actuarial Practice Candidates must choose one of the following: Finance Health, Group Life & Managed Care* Individual Insurance Investments Retirement Benefits	Fall
Professional Development Requirement		
Fellowship Admissions Course		
Other Offerings		
Course	**Title**	**Offered**
EA-1	Enrolled Actuaries Basic Examination	Spring
EA-2, A	Enrolled Actuaries Pension Examination, Segment A	Fall
EA-2, B	Enrolled Actuaries Pension Examination, Segment B	Spring

*****Candidates selecting the Course 8 Health, Group Life and Managed Care examination will also select a subspecialty of either Health and Group Life or Managed Care.

**CAS jointly sponsored.

GENERAL INFORMATION REGARDING EDUCATION AND EXAMINATIONS

Fall 2001 Examination Dates and Times

Course	Duration	Date	Time
Course 1*	4 hours	Thursday, November 8	8:30 AM–12:30 PM
Course 2*	4 hours	Wednesday, November 7	8:30 AM–12:30 PM
Course 3*	4 hours	Tuesday, November 6	8:30 AM–12:30 PM
Course 4*	4 hours	Monday, November 5	8:30 AM–12:30 PM
Course 5	5 hours	Wednesday, October 31	8:30 AM–11:30 AM and 1:00 PM–3:00 PM
Course 8 Finance	6 hours	Thursday, November 1	8:30 AM–11:30 AM and 1:00 PM–4:00 PM
Course 8 Health, Group Life and Managed Care—Health & Group Life Extension	6 hours	Thursday, November 1	8:30 AM–11:30 AM and 1:00 PM–4:00 PM
Course 8 Health, Group Life and Managed Care—Managed Care Extension	6 hours	Thursday, November 1	8:30 AM–11:30 AM and 1:00 PM–4:00 PM
Course 8 Individual Insurance	6 hours	Thursday, November 1	8:30 AM–11:30 AM and 1:00 PM–4:00 PM
Course 8 Investments	6 hours	Thursday, November 1	8:30 AM–11:30 AM and 1:00 PM–4:00 PM
Course 8 Retirement Benefits—Comprehensive Segment	4½ hours	Thursday, November 1	8:30 AM–11:30 AM and 1:00 PM–2:30 PM
Course 8 Retirement Benefits—Pension Funding Mathematics	1½ hours	Friday, November 2	2:00 PM–3:30 PM
EA-2, Segment A	4 hours	Friday, November 2	8:30 AM–12:30 PM

*CAS jointly sponsored.

Tentative Spring 2002 Examination Dates and Times

Course	Duration	Date	Time
Course 1*	4 hours	Wednesday, May 22	8:30 AM–12:30 PM
Course 2*	4 hours	Thursday, May 23	8:30 AM–12:30 PM
Course 3*	4 hours	Thursday, May 16	8:30 AM–12:30 PM
Course 4*	4 hours	Wednesday, May 15	8:30 AM–12:30 PM
Course 6	5 hours	Friday, May 10	8:30 AM–11:30 AM and 1:00 PM–3:00 PM
EA-1	2½ hours	Tuesday, May 14	8:30 AM–11:00 AM
EA-2, Segment B	2½ hours	Tuesday, May 14	1:00 PM–3:30 PM

*CAS jointly sponsored**.**

Course 7

Course 7 Applied Modeling requires passing a pre-test and successfully completing a separate seminar. Pre-tests will be administered the first Friday of the following months: February, April, June, August, October and December. Course 7 seminars are scheduled as follows:

Course 7 Seminars 2001

Sites	2001 Dates	Specialty
Montreal	January 22–25	General (French)
Chicago	February 26–March 1	General
Philadelphia	March 26–29	Pension
Los Angeles	May 14–17	General
Los Angeles	May 14–17	Investment
Toronto	June 25–28	General
Toronto	June 25–28	Life
Chicago	July 23–26	General
Singapore	August 20–23	General
Chicago	August 20–23	General
(East Coast City)	October 1–4	Life
(East Coast City)	October 1–4	Pension
Los Angeles	October 29–November 1	General
Los Angeles	October 29–November 1	Health
Chicago	December 3–6	General
Chicago	December 3–6	Finance

Course 7 pre-test applicants may cancel pre-test registration in writing no less than two weeks prior to the administration of the pre-test. The SOA will refund the registration fee, minus a cancellation fee of $50 (U.S.). No refunds will be considered for Course 7 pre-test applicants who fail to send a written cancellation request and simply do not write the pre-test. A written request to change pre-test registration to an alternate pre-test date will be accommodated when received no less than two weeks prior to the administration of the registered pre-test.

A candidate who submits an application for a Course 7 Seminar, but is unable to attend that seminar may submit a written request for a refund. The SOA will refund the registration fee, minus a cancellation fee of $200 (U.S.). A written request to change Course 7 registration to an alternate date or location will be accommodated when possible and a fee of $100 (U.S.) will be assessed.

Candidates awaiting pre-test results who have submitted a seminar application and who are subsequently unsuccessful on the pre-test will have their seminar registration canceled and registration fee refunded, less a $100 (U.S.) processing fee. These candidates will not be permitted to register for another seminar until they have registered for another pre-test.

The SOA has the right to cancel or reschedule any of the Course 7 seminars if conditions warrant. In the event of a cancellation, full registration fees will be refunded. Candidates registered for a seminar that must be rescheduled may attend on the rescheduled date, choose another available seminar date or apply for a refund without penalty. The SOA will not be held liable for any airline or other cancellation fees assessed attendees in the event of a canceled or rescheduled seminar.

Applications to Write Examinations and Deadlines for Submittal

Applications for all SOA examinations are available in this catalog or may be obtained from the SOA web page (www.soa.org) or the SOA office (847-706-3515). For the Enrolled Actuaries examinations, applications are also available from the American Society of Pension Actuaries (ASPA). Applications for the Casualty Actuarial Society (CAS) examinations are available from the CAS in the 'Students' Corner' of the CAS Web site (www.casact.org).

A candidate may not write an examination for a course for which the candidate already has credit.

Applications must be received on or before April 1 for the May session, and on or before September 24 for the November session. Applications received after the deadline will not be considered.

A registered candidate who requests a change of examination center must pay a $50 (U.S.) change-of-center fee. *No change of center may be made after April 1 for the May examinations, or after September 24 for the November examinations.*

The registration deadline for the Course 7 pre-test is no later than two weeks prior to the administration of the pre-test (administered on the first Friday of the following months: February, April, June, August, October and December). Applications for a Course 7 seminar must be received no later than four weeks prior to the starting date of the seminar.

Candidates will not be considered registered for an examination until the SOA has received an original, signed application for the examination session. Unsigned, photocopied or facsimile applications are not valid. **All applications must include an original signature of the candidate.**

Course Fees

Fees listed in this Catalog are guaranteed through the Fall 2001 examination session only. Candidates will be notified of any changes in fees. The examination fees for Courses 1–4 include electronic access to the required study notes.

Course Fees for Fall 2001

Course	Course Fee*
Course 1**	$ 95.00
Course 2**	$ 140.00
Course 3**	$ 340.00
Course 3 Student Fee**	$ 275.00
Course 4**	$ 340.00
Course 4 Student Fee**	$ 275.00
Course 5	$ 625.00
Course 7 Pre-test	$ 125.00
Course 7 Seminar	$ 900.00
Course 8 Finance Health, Group Life and Managed Care Individual Insurance Investments	$ 800.00
Course 8 Retirement Benefits— Comprehensive Segment	$ 600.00
Course 8 Retirement Benefits— Pension Funding Segment	$ 200.00
EA-2, Segment A	$ 125.00
Professional Development (Filing Fee)	$ 150.00

*All amounts in U.S. dollars.
**CAS jointly sponsored.

Student fees are available only to candidates currently enrolled in full-time university study programs.

Reduced examination fees are available to qualified candidates in eligible countries. Please see the SOA Web site at www.soa.org/eande/examdiscount_program.html or contact the Manager of International Affairs at msikaras@soa.org.

Fees should be remitted in U.S. funds (or equivalent) by check, money order, American Express, MasterCard or Visa. Please note that payment in non-U.S. currency may slightly delay the processing of the application.

Refunds

A candidate who submits an application for an examination but does not write that examination may submit a written request for an examination refund. **A $50 (U.S.) administrative fee is assessed on all refunds.** The written request must be received at the SOA no later than December 31, 2001 for the November examinations. Requests will not be considered after this date. *Change-of-center fees and fees for writing at specially arranged centers will not be refunded.* ***Fees cannot be transferred from one session to another.*** Special policies apply to the Course 7 pre-test and seminar. Please see page 7 for additional details.

Examination Locations

Regular examination centers are set up in many locations, with consideration given to the number of candidates in the vicinity and the availability of appropriate facilities and supervisory personnel. Special examination centers may be arranged at the discretion of the SOA office. The additional fee for these special centers is $50 (U.S.); *requests must be received by the* ***September 24 registration deadline*** *for the November examinations*.

Examination centers are listed on the examination application. A candidate's examination center will be indicated on the Ticket of Admission.

Special Arrangements for Candidates with Disabilities

A candidate with a formally diagnosed disability who needs special testing arrangements must submit a written request to the SOA office for each session the candidate intends to write. 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 are also considered. *Requests for special arrangements and supporting documentation must be submitted, at the applicant's expense,* ***no later than September 24*** *for the November examinations*.

Food and Beverage in Examination Room

Candidates will be permitted to bring bottled water into the examination room. No food or other beverage, except as required for medical situations and with preauthorization provided, will be permitted. Candidates requiring special accommodations must submit a written request with their application. Written requests should be directed to the Examination Services Department c/o Society of Actuaries.

Ticket of Admission/Instructions to Candidates

The SOA office will mail each candidate: 1) a *Ticket of Admission,* which indicates the examination(s) for which the candidate is registered, and 2) the *Instructions to Candidates,* which covers administrative details about the examination as well as exact examination center locations. ***This Ticket of Admission must be brought to the examination center***. Tickets of Admission will be mailed beginning March 1 for the May session and September 1 for the November session. The ticket indicates the examination center to which the candidate should report and also provides the candidate number. This candidate number is to be written by the candidate on the examination(s) for identification purposes. Candidates are strongly encouraged to retain their candidate numbers after the examination session is completed. A candidate number is required to access pass/fail information through the SOA **"automated hot line"**.

A candidate who has not received a Ticket of Admission two weeks prior to the examination, or whose ticket contains incorrect information, should call the SOA Examination Services Department at ***847-706-3583****.*

The Ticket of Admission also serves as a receipt and should be retained if needed for tax purposes.

Requirements for Admission to Examination Center

To be admitted into an examination center, each candidate must present a valid Ticket of Admission as well as positive identification with a signature and a photograph (e.g., driver's license, passport, school or work I.D., etc.). If a photo I.D. 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.

Signatures on Examination Answer Sheets and Envelopes

Candidates are **required** to sign their answer sheets and envelopes. Examinations without a signed statement on the multiple-choice answer sheet or written-answer envelope will not receive a grade for those examinations. The statement to be signed reads:

> **"I have neither given nor received assistance of any kind on this examination. I understand the examination is confidential and will not disclose its contents.**
>
> **This examination is being written with the understanding that if the answer sheet/envelope is returned unsigned, it will not be graded."**

Envelopes for written-answer examinations will be opened in the SOA office. Committee officers and graders will receive information identifying candidates only by candidate number.

Bilingual Examinations in Canada

For examination centers in Canada, examination booklets for all examinations are printed in both English and French. For bilingual examinations, responses to written-answer questions may be in either English or French. Written answer responses on the Course 7 pre-test as well as the Course 7 seminar project may also be written in either English or French.

Use of Calculators and Other Assistance in Writing Examinations

Only the calculators described in the following paragraphs may be brought into the examination room. Books, papers, computers or other electronic devices may not be brought into the examination room.

For the 2001 examination administrations, candidates may use the battery- or solar-powered Texas Instruments BA-35 model calculator (the official SOA/CAS calculator), the TI-30X or TI-30Xa (the official CAS calculator) or TI-30X II* (IIS solar or IIB battery.) Candidates using any of these calculators need not have calculators with the SOA or CAS logo; candidates may also continue to use any previous calculator model that bears either logo. Candidates may use more than one of the approved calculators during an examination.

The same calculator models are approved for use on the joint SOA/CAS examinations as well as the SOA examinations. For the Enrolled Actuaries (EA) examinations, candidates may use any model that meets the specifications of the Joint Board for the Enrollment of Actuaries. Specifications are listed in the Joint Board's *Examination Program*. Candidates writing these examinations will receive a special set of calculator rules with their tickets of admission. All of the approved SOA models meet the specifications of the Joint Board.

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

Calculators are no longer available for purchase through the SOA. Candidates can purchase calculators from some of the book distributors listed in the back of this catalog or from Texas Instruments, Attention: Order Entry, PO Box 650311, Mail Station 3962, Dallas, TX 75265, and phone 800-842-2737.

** The memory of **TI-30X II** (IIS solar or IIB battery) will need to be cleared by the examination supervisor upon the candidates' entrance to the examination room.*

Examination Results

Candidates receive individual statements of their examination results, usually eight to ten weeks after the examination date. A few weeks later, a list of the names of passing candidates for the examination session is made available through the SOA web page (www.soa.org).

Grades are reported on a 0 to 10 scale. Passing grades range from 6 to 10; failing grades range from 0 to 5. On this scale, the interval is 10 percent of the score required to pass; for example, a grade of 5 means failing with a score of at least 90 percent but less than 100 percent of the score required to pass. A grade of 0 does not mean that the candidate received no points, but that the candidate's score was less than 50 percent of the score required to pass.

Upon request, a copy of the candidate's answer sheet for EA-1 or EA-2 is available from the Joint Board for the Enrollment of Actuaries. Examination answer sheets are not returned to candidates for any other SOA examination. For certain examinations, an analysis of results is automatically sent to failing candidates.

An automated "hotline" service begins once grades have been mailed. A candidate may call the hotline at 847-706-3579. This automated "hotline" is an Interactive Voice Response (IVR) system that, with the use of the confidential candidate number and touch-tone phone, allows access to examination results, 24 hours a day, 7 days a week. This IVR system is designed only to give pass/fail results; no other information will be available. The hotline operates for a limited time each examination session after grades are mailed. Once examination results are released candidates are also able to access lists of passing candidate numbers via the SOA Web site.

Note: To preserve candidate confidentiality, in the event of a lost or misplaced candidate number, phone and facsimile requests to obtain the candidate number will not be honored by the SOA.

Lost Examinations

If a completed examination answer sheet or the written answers for an examination are inadvertently lost or destroyed, the examination fee will be refunded. The SOA and any jointly administering or sponsoring organizations assume no other obligation, and candidates must take all examinations subject to this understanding. The one exception to this policy is noted in the following paragraph.

In the case of a multiple-choice examination, whenever reasonably possible, the SOA will make use of a candidate's examination book to reconstruct the answers selected by the candidate. Where a candidate has clearly indicated the response selected for each question, the E&E Steering and Coordinating Committee can determine when the candidate demonstrates a passing performance and give that candidate a passing grade. Therefore, candidates may want 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.

Defective Questions

Occasionally, through an inadvertent error or a difference in interpretation, an examination question is found to be defective. Examples of defects might include typographical errors, ambiguities, or questions that test material no longer covered in the Course of Reading. Candidates who believe that a question is defective should write to the E&E Ombudsperson at the SOA within two weeks of the date the examination was administered. This letter should explain in detail why the question seems to be defective. The SOA E&E Committee will investigate all questions brought to its attention in this way, and may make allowances in the grading process, if appropriate. The E&E Committee may make use of candidates' examination books to determine whether their scores should be adjusted. The committee cannot consider correspondence which does not reach the SOA office within two weeks after the examination administration.

Confidentiality of Examination Records

The fact that a candidate has passed an examination for credit with the SOA is considered public knowledge. Any further information about the examinations taken or grades received by a candidate is available only to that candidate and to E&E Committee Officers as required for Committee purposes. However, a candidate may request in writing to the SOA office that a designated person or institution should receive such information.

Disciplinary Action

Candidates must not give or receive assistance of any kind during the examination. Any cheating, any attempt to cheat, assisting others to cheat, or participating therein, or engaging in such improper conduct as listed below is a serious violation and will generally result in the SOA disqualifying the candidate's paper, and such 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:

1. Gaining access to examination questions before the examination.
2. Using an unauthorized calculator 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.
18. Presenting false information on an examination application.
19. Failing to remain in the examination room for the duration of the examination or a minimum of two hours.
20. Failing to follow other examination instructions.

The E&E Committee of the SOA will pursue any evidence that a candidate has cheated or failed to follow examination rules, either in letter or spirit. Any irregularity or suspected violation will be investigated. When a violation is confirmed, disciplinary actions may include, but are not limited to, disqualification of the candidate's examination paper and a prohibition against writing SOA examinations for a specified period. The SOA rules and regulations concerning examination administration, including disciplinary action, are comprised of the information in this Catalog, as well as the information in the *Instructions to Candidates* mailed with the Tickets of Admission, the information on the covers of examination booklets, and the material read by the supervisors during each examination administration. 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 (such as an irregularity, violation or cheating, and any hearings thereon) may, at the sole discretion of the SOA, be disclosed to any other bona fide actuarial organization that has a legitimate interest in such results and/or action."**

The SOA may, at its sole discretion, disclose to any other bona fide actuarial organization having a legitimate interest, information on the identity of any 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.

Where an actuarial organization with which the SOA has a direct working relationship invokes a penalty against a candidate for an examination-related violation on an examination for which the SOA is

not a joint sponsor or administrator, the SOA will invoke the same penalty on the candidate with respect to writing any SOA examinations.

Candidates will have the right to appeal the SOA's application of the disciplinary decision of another actuarial organization. Where a candidate makes such an appeal, the SOA will request the transfer of the appropriate disciplinary case files, including all direct evidence, from the other organization to the SOA for disposition of the appeal under the general provisions of the SOA disciplinary process.

If a candidate appeals an SOA examination-related disciplinary penalty to another actuarial organization invoking the same penalty based on the reciprocal agreement, the SOA will provide the relevant disciplinary case files upon receipt of formal written request from the organization, subject to the applicable SOA policies and procedures (and respecting the legitimate protection of the SOA attorney/client privileged communication). The candidate will be required to acknowledge that the appeal requires the exchange of the confidential information between the SOA and the other organization, and must provide written authorization for the release of the information to the other organization.

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

Candidates who desire a copy of the full procedures followed in disciplinary cases should send a written request to the Education & Examination Ombudsperson at the SOA office address.

Notice to Candidates for EA Designation

The Joint Board for the Enrollment of Actuaries has restructured the examinations it offers effective May 2001. The need for restructuring is based on the expansion of the body of law affecting the private pension system and the corresponding increase in the complexity of the work for which enrolled actuaries are responsible. Descriptions of the transition and proposed changes are provided in IRS Announcement 99-25. This announcement may be obtained through the Internet at www.irs.gov. Click on *Tax Info for Business* and choose IRS Bulletin 1999-12 for Announcement 99-25. Information is also available on the SOA Web page.

Credit for Examinations Passed in Other Actuarial Organizations

The BOG may waive certain requirements for passing some examinations of the SOA if the applicant has passed substantially equivalent examinations that are required by another recognized actuarial organization. Requests for these waivers should be sent to the Registrar at the SOA office.

FSAs Writing Examinations

FSAs have expressed a desire to write SOA examinations to satisfy a professional continuing education provision, or to acquire new knowledge. The SOA supports enabling FSAs with a legitimate purpose to write SOA examinations, subject to limited restrictions.

As is the case for all candidates, FSAs cannot write examinations they have previously passed unless such demonstration is required to satisfy licensing/certification continuing education requirements (e.g., Enrolled Actuaries in the U.S.).

FSAs serving on an education or examination committee may need to separate themselves from that committee involvement for a period of time before taking an examination. FSAs who are interested in writing an SOA examination but have questions about any relevant restrictions should contact the E&E Ombudsperson at 847-706-3527 or ombudsperson@soa.org.

Joint Sponsorship

The Casualty Actuarial Society (CAS) jointly sponsors and administers Courses 1–4 with the SOA. These four courses/exams are the basis for the Preliminary Actuarial Examinations. They form a body of knowledge common to all actuarial candidates. The Associateship and Fellowship examinations administered by the SOA are jointly sponsored by the American Academy of Actuaries (AAA), the Canadian Institute of Actuaries (CIA), the Conference of Consulting Actuaries (CCA), and the SOA. In addition, the American Society of Pension Actuaries and the Joint Board for the Enrollment of Actuaries

jointly sponsor and administer EA-1; EA-2, A and EA-2, B with the SOA. The addresses for the above organizations can be found on the back inside cover of this catalog.

Correspondence

Requests for application forms or correspondence regarding examinations, study notes (SNs), classes, or other matters should be e-mailed to pgarrity@soa.org, downloaded from www.soa.org, or mailed to:

Society of Actuaries
Education Services Representative
475 North Martingale Road
Suite 800
Schaumburg, Illinois 60173-2226 U.S.A.

THE EDUCATION AND EXAMINATION COMMITTEE

Organizational Structure of the Education and Examination Committee

The Education and Examination (E&E) Steering and Coordinating Committee oversees the basic education program of the SOA. Within this overall committee, two separate committees operate. The Education Committee is responsible for the selection and development of the study material for the SOA basic educational programs. The Examination Committee is responsible for the development and grading of the examinations. Both of these committees report to the General Chairperson. Each of these committees has its own Chairperson and several General Officers. The E&E Committee operates under guidelines set by the SOA E&E Management Committee.

The Education Committee is responsible for determining the content of the Course of Reading and learning objectives. Input and suggestions for improvements may come from many sources, including the SOA Staff Fellows, the individual examination committees, Education Committee members, Sections and Practice Areas, the general SOA membership, academics, and candidates.

The Examination Committee consists of several individual examination committees, each responsible for specified examinations. Each examination committee develops and is responsible for the initial review of all of the questions to be included in its examinations. The committee recommends the pass marks for its examinations.

Review and Development of Course of Reading

The Course of Reading is reviewed regularly by members of the Education Committee. Both short-term and long-term goals for improvement are developed. Textbooks and articles may be selected or SNs developed to be included in the Course of Reading. From time to time, new textbooks are written for the specific purpose of inclusion in the Course of Reading.

If new study material needs to be developed, or existing material needs to be revised, authors and reviewers who are experts in the area are recruited. 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 sent to the Core Studies Department of the SOA office in care of the Ombudsperson.

Every effort is made to present educational material clearly and unambiguously. Occasionally, however, errors do occur. Candidates who believe that they have found an error in any study material should write to the Core Studies Department at the SOA office in care of the Ombudsperson so that any necessary corrective action may be taken.

Development of Examinations

Each examination is developed by the appropriate committee to test candidates' knowledge of the subject matter as defined in the Course of Reading in this Catalog. The officers of the individual examination committee, one or more General Officers, and where applicable, representatives of jointly administering organizations, review each examination to assure its quality.

Every effort is made to ensure that the questions fall within the scope of the Course of Reading, and that each question can be answered in the allocated time. Complete coverage of all parts of the Course of Reading is not practical for every examination every year, but the goal is to develop well-rounded examinations containing representative, high-quality questions that test the candidates' knowledge and ability to make use of material from many parts of the Course of Reading. Trick questions are avoided, and the wording of each question is carefully considered to eliminate possible ambiguities. Preliminary versions of each examination are thoroughly reviewed in relation to all of these factors before the final examination is set.

Grading Process

Multiple-choice questions are scored by optical-scanning equipment. As a check, several papers for each examination are scored by hand. Only the answer sheet determines the score. No credit, partial or full, is given for anything written in the multiple-choice examination book, except as indicated in the next paragraph and as described on page 11.

A multiple-choice question found to be defective may be discarded, leaving scores and rankings as they would have been if the defective question had not been asked. In this situation, the individual

examination chairperson may examine the examination books of candidates with the highest failing scores to see if credit should be granted for work on the defective question. See page 11 for information on defective questions.

For all multiple-choice examinations, no guessing adjustment is made to candidates' scores. Therefore, candidates will maximize their scores by answering every question, even if some of those answers are pure guesses. When there is no guessing adjustment, there is never an advantage to be gained by omitting a question.

For written-answer questions, every effort is made to grade the answers according to completely objective standards. The anonymity of the candidates is fully preserved; committee members see only a candidate number when grading a written-answer examination. Each examination committee has the same grading process adjusted for the number of papers to be graded. A committee with a relatively small number of papers to grade might work as follows.

A single committee member is assigned to grade each written-answer question. The grader starts with a grading outline that lists possible items that are directly relevant to the question with numerical values set according to each item's importance. All answers are measured against the same grading outline to ensure that the same standards are applied to all candidates. Written-answer scores are then combined with multiple-choice scores.

Approximately one-third to one-half of the candidates—those with scores fairly near the expected pass mark—will have their written-answer papers regraded at a central grading session. The papers of the other candidates will not be regraded, since their scores would not change sufficiently to move from pass to fail or vice versa.

At the central grading session, a different committee member using the same grading outline independently grades each paper. If the second grader's score on a question varies from the first grader's score by more than a small defined tolerance, the two graders discuss the paper in detail and settle upon a score.

For an examination with a relatively large number of candidates, two or more graders will be assigned to each question at the beginning and procedures modified accordingly.

Papers are retained for six months in case questions or problems arise that would warrant special action. After this, the papers are destroyed.

Determination of the Pass Mark

The objective of the examinations is to identify those candidates who, as a prerequisite for qualifying for Associateship and/or Fellowship, demonstrate adequate knowledge of the Course of Reading based on standards that are formulated and applied consistently from year to year.

For the multiple-choice examinations, a panel of experts in the subject material is convened to review the examination. 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 minimally prepared candidate would answer the question correctly. The sum of these probabilities, averaged across the panel of experts, gives a preliminary estimate of the pass mark. Performance on the examinations is considered in finalizing the pass mark and especially the effect of any particularly difficult questions. For written-answer questions, the assessment process is more difficult. A similar panel of experts is used, and a sample of actual candidate responses is used in the review. Each expert reviews each response in the sample, and makes an assessment as to how well the candidate demonstrated that they understood the material. The responses are then sorted into broad categories, relative to how close they are to the pass/fail line (in the opinion of the expert, for that particular question). The sum of the average scores of those papers closest to the pass/fail line provides a good indication of a preliminary pass mark.

There is no preconceived notion of the passing percentage. With the use of content based passmarks, a fluctuation from session to session is expected. The final decision is reached by consultation among the Chairperson and Vice-Chairpersons of the individual examination committee and Officers of the E&E Committee.

These procedures are somewhat different, however, for EA-1, EA-2, A and EA-2, B, which are jointly administered by ASPA, the Joint Board for the Enrollment of Actuaries, and the SOA. For the purposes of EA credit, the Joint Board sets the pass mark. Each of the sponsoring organizations has the right to set its own pass mark for credit towards its own educational requirements. While a common pass mark

is anticipated, it is possible for the SOA pass mark to differ from the pass marks of the other sponsoring organizations.

SUGGESTIONS FOR CANDIDATES

Study Methods

For mathematical examinations, candidates should acquire proficiency with techniques and formulas by working on a large number of problems similar to those expected on the examinations.

For any examination, schedule study time so that each subject is covered adequately. Try to approach each subject from more than one perspective. Do not limit yourself to the approach taken in daily work. Maintain an interest in current developments. Knowledge of actuarial practice is helpful. The discussions of papers, unless excluded, are an essential part of the reading and should be studied as carefully as the papers themselves. Integrate the material studied. Compare programs, methods and so on. The more connections developed in the studied material, the deeper the understanding and the better the use made of the acquired information.

Maintain contact with other candidates and take advantage of the opportunities to discuss difficult topics. Do not hesitate to consult established members of the profession in your own organization or elsewhere.

Do not rely solely on commercial outlines of study material. Rather, strive to summarize knowledge of the material by adequate review prior to the examination. For written-answer examinations, try constructing "trial" examinations. These trial examinations will not only test knowledge and understanding of the Course of Reading, but they may also improve speed and confidence.

Expect integrated questions. Integrated questions encompass different sections of the material, and require the candidate to pull together various concepts into a cohesive response. This method mirrors a real-life situation, and provides a better discriminator with regards to who demonstrates understanding of the material.

Meet the Learning Objectives

In the SOA Basic Education Catalog, we provide a set of learning objectives for each course. Our goal is that, by the time of the examination, candidates will have met those learning objectives and can demonstrate that knowledge on the examination. From that perspective, it's no longer sufficient to have just gone through all the material on the syllabus. Candidates need to be confident that they have met all the learning objectives. Note that the objectives are stated in terms of being able to "do" something, as opposed to "knowing" something. This is a subtle difference, but important when it comes to being successful on the examination.

Structure Written-Answer Responses Accordingly

Because we are now asking questions which require more integration of material, candidates should structure their responses on the examination in a similar way. A candidate who can synthesize concepts into an organized answer will perform better than a candidate who simply recites facts. Even though the examinations contain larger questions in terms of point value, we have taken into account the fact that candidates will need time to think through the issues and formulate an integrated response. Extra time has been built into the point values for that purpose.

Become Familiar with the Case Study

All of the Course 8 examinations contain a case study. This is a good way to bring real-life applications into the study setting. A common misconception that candidates may have is that the case study is simply another study note. In fact, the case study is used to link into as much of the examination material as possible, and references to the case study will appear on the examination. It is a good idea to read through the case study before reviewing anything else on the syllabus, and refer back to the case study as new topics are covered. As a reminder, candidates will not be permitted to bring their copy of the case study into the examination room.

Review Classes and Seminars

Many candidates study by themselves or participate in informal study groups to prepare for examinations, but a few additional options are available. In certain areas, universities or actuarial clubs offer classes to assist candidates. Check with your employer or with local clubs about class availability in your area, or complete the review classes form in the catalog and send it to the Core Studies Department at the SOA office.

Review seminars and workshops are held at several universities and in various cities. Order forms are included with your study note order, or can be requested from the SOA office.

Study Manuals

Study manuals for examinations administered by the SOA are available from various sources not associated with the SOA. These contain material such as summary outlines of Course of Reading material, various types of practice problems, and, in some cases, solutions to recent sample examination problems.

These study materials are neither a part of the Course of Reading nor a substitute for the SOA SNs; nor do they reflect any official interpretation, opinion or endorsement of the SOA or its E&E Committee.

Some book distributors carry study manuals, as shown on their order forms. Order forms for study manuals are included with the SOA SNs. Order forms also are available from the SOA Office on request.

The required SOA SNs are not contained in any of these study manuals. The official SNs are available only from the SOA, and are obtained by completing the order form from the back of this Catalog and sending the form, along with the appropriate payment, to the address indicated on the order form. (Study notes for Courses 1–4 are available electronically on the SOA Web site, www.soa.org.)

Approaches to Writing Multiple-Choice Examinations

A key to success in writing multiple-choice examinations is to make steady progress through the questions. Do not spend a disproportionate amount of time on a single question with which you are having trouble. Move on, and come back to it if time is left at the end. Chances of correctly completing the greatest number of questions are increased if each question is attempted seriously at least once. It may help to determine the proportionate number of questions to answer in the first half hour of the examination, check how much ground was actually covered in that time and adjust the pace accordingly.

When pressed for time, a good strategy is to omit questions that are expected to require more than average time and use the time to complete a larger number of more quickly answered questions. For example, if a cluster of questions with a common introduction is not readily grasped, skip the entire cluster on the first attempt. Look for questions that deal with more familiar subject matter.

When answering a question, look for the quickest way possible to arrive at the correct choice and mark it on your answer sheet.

If a question is encountered for which all choices appear to be incorrect, simply move on. It later may be determined that one of the answers is correct. Also, develop shortcuts for eliminating impossible answers by checking out boundary conditions, inspecting other aspects of certain suggested solutions, or substituting numerical values.

Because there is **no** guessing adjustment, mark an answer choice on the answer sheet for every examination question.

Approaches to Writing Written-Answer Examinations

Written-answer questions are intended to elicit answers in essay and/or outline form. Numerical written-answer questions require extended numerical or formula solutions; credit given is based not only on the correct results, but also on the steps used to derive these results. Candidates should define formulas and show all work.

Paper is provided at the examination room for your answers. Take time to write legibly, since graders can only give credit for what they can read.

Each written-answer question is assigned a specified number of points. The number of points indicates the relative weighting each question bears to the total examination and to other questions and suggests the relative time that should be spent on that question. Try to distribute the examination time over all questions and limit consideration of any question to the time proportionately allotted to it. Generally, it will be more profitable to write at least a brief answer to a question for which you are relatively unprepared than to spend time refining an answer to a question on which you are well informed. No extra points are given for padding an answer.

Read each question thoroughly. Before starting to write, determine what is being asked and try to organize the intended answer. It is most important to answer the question that is asked. Points are not awarded for providing a good answer to a question not asked. It may be helpful to write a brief outline before beginning the actual answer. Answer the questions in any order. Some candidates prefer to answer the questions in the order given, while others read over the entire paper, warm up with an answer that comes easily, and gradually work into the more challenging questions.

It may be helpful to jot down on scratch paper ideas that come to mind concerning both answered and unanswered questions. (Hand in the scratch paper with the rest of your papers.) Questions may be

answered in outline form, provided the meaning is clear and the question is fully answered. Another acceptable technique is to use one sheet of paper for "advantages" and another for "disadvantages," and similarly for other contrasts. This method allows going back and forth from one page to the other and putting down items as they occur. Use as much paper as needed. An uncrowded and orderly presentation can do no harm, and the use of additional pages may result in putting down further facts and considerations which earn additional credit.

If you believe that there is a better answer or approach than what is indicated in the Course of Reading (e.g., because of recent changes in regulations), it is acceptable to provide this answer, although state at the outset that this answer differs from the Course of Reading. If possible, also indicate the answer or approach given by the Course of Reading, thus demonstrating to the individual examination committee that the assigned material was read and mastered. However, there is no advantage to adding to an answer that is already complete.

Obscure interpretations should not be read into a question; each question is designed to be straightforward. Try to cover all aspects of the question in the answer, and include pertinent facts and details even if, based on practical experience, they seem obvious. However, including facts and details not pertinent to the question will waste examination time and will not earn any additional credit. Do not expand upon one or two points to the exclusion of others of equal importance. Try to state both sides of a question where called for in an answer. Do not, however, try to hedge an issue if a definitive statement is called for; no additional credit will be earned through that approach. If the question involves calculations, show all formulas and work involved in arriving at the answer. If time permits, review your answers.

In most written-answer examinations, there is an average of three minutes for every examination point. However, it may be helpful to adjust the time per question to leave some time for the initial reading of the entire paper and for a final review. Then allocate the net remaining time in proportion to the points for each question. It is well worth attempting every question; generally some credit will be earned, even if a question is only partially answered. However, when no more can be done on a question (even though some time remains for it), move on to another.

Questions will cross subject lines. Prepare for this by thoroughly understanding the interrelationship of the various subjects within each course.

Case studies will be used as the basis for questions on the Course 8 examinations. Be sure to answer the question asked by referring to the case study. For example, when asked for the advantages of a particular plan design to the company referenced in the case study, limit the response to that company. Do not list other advantages as they are extraneous to the question and will result in no additional credit. Further, if they conflict with the applicable advantages, no credit will be given.

Since each question is graded separately, each of the answers must be self-contained. An answer must not say, for example, "Part of the answer to question 1 is found in the answer to question 3." Also, each answer must be started on a new sheet of paper.

Education and Examination (E&E) Ombudsperson

In an effort to remain responsive to the individual concerns of candidates, the SOA has an E&E Ombudsperson. The Ombudsperson is available to respond to non-routine E&E inquiries from candidates, and to direct candidate inquiries to the appropriate staff member or department. Candidates may contact the Ombudsperson at 847-706-3527 (phone); 847-706-3599 (fax); or ombudsperson@soa.org.

COURSE OF READING AND DESCRIPTION OF FALL 2001 EXAMINATIONS

The following Course of Reading is a guide to those preparing for the examinations. The objective of the examinations is to test the candidates' ability to grasp the underlying principles and apply them in the solution of problems.

A "#" indicates a **change** in the Course of Reading from a previous syllabus (new or revised study material, shift of study material from one examination to another, different chapter references from a previously used textbook, etc.)

A "†" indicates a **new edition** or first time use of a **new textbook**.

If a paper or article from an actuarial or insurance publication is recommended for study, candidates should study any discussions of the papers or articles published in the same volume, unless the Course of Reading or SNs indicate otherwise. All appendices should be included as reading material unless it is stated in the syllabus that they are excluded.

An item noted as "background reading" may be helpful to the candidate in providing additional background on a topic. No examination questions will be based on an item noted as background reading.

Candidates are expected to obtain their own copies of software and texts from the distributors, publishers or actuarial organizations listed in the back of the catalog. SNs must be purchased from the SOA. For those candidates who do not have access to TSA, TSA Reports, RSA, NAAJ or other published references, they are available for purchase. The study note and published reference order form is located in the back of the catalog. **It is advisable to check the various Web sites as some of the published references may be available on-line.**

References to publications of the SOA, the CCA, the CIA, AAA and the ASB are abbreviated in the Course of Reading. These abbreviations can be found in the Miscellaneous Information section.

Study Notes

General Information

Candidates are urged to obtain SNs for any examination that they plan to take. SNs for Courses 1–4 are available electronically on the SOA Web site, www.soa.org.

The E&E Committee publishes SNs to help candidates prepare for the examinations. In some instances, SNs are the principal references; in others, they are designed to coordinate the subject for the candidate or to complement other readings.

Sample questions, illustrative solutions, and answer keys for Course examinations 1–6, Course 7 pre-test, and Course 8 are available as part of the set of SNs.

Introductory Study Notes (ISNs) contain important information about the examinations, including any changes to the Course of Reading, changes in examination times or dates, errata and descriptions of examination formats.

Occasionally, the Course of Reading for an examination may be changed after publication of the Catalog. Such a change will be announced in the ISN for the affected examination. *If any conflict exists between information contained in this Catalog and that contained in the ISNs, the ISN will govern.*

Ordering SNs

Paper copies of SNs for Courses 1–4 may be ordered after January 1 for the spring administration and July 1 for the fall administration. SNs for Courses 1–4 are available electronically.

SNs may be ordered after December 1 for Course 6 and June 1 for Courses 5 and 8. Course 7 pre-test study notes may be ordered throughout the year. SNs for Courses 5, 6, and 8 are available in two forms—Complete Sets (which contain all revisions) or Revisions Only. The Complete Set contains the ISN, at least one sample examination for the course, and all SNs on the syllabus for the course. The Revisions Only package contains the ISN, the most recently released sample examination for the course, and those SNs that are new to the syllabus or that have been revised since the previous administration of the respective examination. Candidates who are writing the course examination for the first time should order a Complete Set of SNs rather than the Revisions Only package.

Study Note fees are listed on the order form at the back of this catalog. The completed order form, together with the total payment (check or money order in U.S. funds, payable to the **SOA**; or charged to American Express, MasterCard or Visa) should be sent to the address on the order form. **SN fees are not refundable**.

In referring to the sample questions, candidates should keep in mind that the questions are intended to serve as a study aid, and that the actual examinations may vary somewhat as to the proportion of question styles and subjects. New forms of questions may appear, and certain forms may not be used in the future.

Questions concerning SNs or SN orders should be directed to the Publication Orders Manager at 847-706-3525 or azionce@soa.org.

Course 1 Mathematical Foundations of Actuarial Science

This course is jointly administered by the SOA and CAS.

The examination for this course consists of four hours of multiple-choice questions and is identical to CAS Exam 1.

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

The tools emphasized are:

- Limits, series, sequences and functions;
- Derivatives of single and multivariate functions (maximums, minimums, constrained maximums and minimums, rate of change);
- Integrals of single and multivariate functions, simple differential equations;
- Vector-valued functions (polar coordinates, parameterized curves);
- General probability (set functions, basic axioms, independence);
- Bayes' Theorem;
- Univariate probability distributions (probabilities, moments, variance, mode, percentiles, transformations);
- Multivariate probability distributions (Central Limit Theorem; joint, conditional and marginal distributions—probabilities, moments, variance, covariance).

A table of values for the normal distribution will be included with the examination booklet.

Suggested Texts

The texts listed below are considered representative of the many texts used by colleges and universities in Canada and the US to cover material on which the candidate may be examined. Earlier or later editions of the listed texts contain essentially the same material and should be adequate for review purposes. In addition there are study notes for this course. The candidate is expected to be familiar with the concepts introduced in the study notes.

Calculus

- *Calculus: A New Horizon* (Sixth Edition), 1999, by Anton, H.
- *Calculus with Analytic Geometry* (Fifth Edition), 1997, by Edwards, C.H. and Penney, D.E.
- *Calculus: Single and Multivariable* (Second Edition), 1998, by Hughes-Hallett, D., Gleason, A.M. and McCallum, W.G.
- *Calculus and Analytic Geometry* (Tenth Edition), 2001, by Thomas, G.B. and Finney, R.L.

Probability

- *A First Course in Probability* (Fifth Edition), 1998, by Ross, S.M., Chapters 1–8.
- *Fundamentals of Probability* (Second Edition), 1999, by Ghahramani, S., Chapters 1–10.
- *Probability for Risk Management*, 1999, by Hassett, M. and Stewart, D., Chapters 1–11.
- *Probability and Statistical Inference* (Sixth Edition), 2001, by Hogg, R.V. and Tanis, E.A., Chapters 1–6.

Study Notes

SNs for Courses 1–4 are available on our Web site. Hard copies may be purchased by using the Study Note and Published Reference order form in the back of this catalog.

Study Notes, textbook errata, tables, sample examinations, and updates and/or corrections to the Course of Reading can be found on the SOA Web site http://www.soa.org/eande/fall01_catalog/fall01_sn_info.html.

Code	Title
1-11-01#	Course 1 Introductory Study Note
1-10-00	May 2000 Course/Exam 1
1-12-00	November 2000 Course/Exam 1
1-10-01#	May 2001 Course/Exam 1
1-21-00	Risk and Insurance

Course 2 Interest Theory, Economics and Finance

This course is jointly administered by the SOA and CAS.

The examination for this course consists of four hours of multiple-choice questions and is identical to CAS Exam 2.

This course covers interest theory (discrete and continuous), intermediate microeconomics and macroeconomics and the fundamentals of finance. It assumes a basic knowledge of calculus and probability.

A table of values for the normal distribution will be included with the examination booklet.

Learning Objectives

A. Economics

1. Microeconomics
   a. Candidates should be able to use the following microeconomic principles to build models to increase their understanding of the framework of contingent events and to use as a frame for activities such as pricing:
      - The shape of the Demand Curve, demand versus quantity demanded, changes in demand, and market demand,
      - The supply versus quantity supplied equilibrium and the point of equilibrium and changes in the equilibrium point,
      - Tastes, indifference curves and the Marginal Rate of Substitution,
      - Changes in income and the budget line, the Engel Curve,
      - Changes in price and changes in the budget line, the Demand Curve,
      - Income and substitution effects, the Compensated Demand Curve, why Demand Curves slope downward,
      - Decisions under uncertainty such as the following: attitudes toward risk and the risk and theory of rational expectations,
      - Adverse selection and moral hazard.
   b. Candidates should be able to use knowledge of the following microeconomic principles to increase their understanding of the markets in which we operate and of the regulatory issues, also to use the following microeconomic principles to increase their understanding of the ramification of strategic decisions:
      - The competitive firm, the competitive industry in the short run, revenue, costs and supply, elasticity of supply, competitive equilibrium,
      - The competitive firm, the competitive industry in the long run, long run costs, supply profits, constant/decreasing-cost industries, and equilibrium,
      - Sources of monopoly power: natural, patents, resources, and legal barriers,
      - Oligopoly, contestable markets, a fixed number of firms,
      - Collusion, game theory, the prisoner's dilemma, and the breakdown of cartels,
      - Monopolistic competition, product differentiation and the economics of location,
      - Consumers and producers surplus economics, theories of values,
      - Adverse selection and moral hazard.
2. Macroeconomics
   a. Candidates should understand the following macroeconomic principles and use them in developing economic models and/or economic assumptions:
      - The general accounting conventions and data sources used in tracking economic activity,
      - The simplified Keynesian model, without adjustments for changes in price level or money supply, as it applies to changes in GDP caused by changes in investment, government spending, and net exports,
      - The relationship among interest rates, demand for money, consumption and investment using concepts such as the IS/LM curve, fiscal and monetary policy, and how foreign exchange rates affect GDP/NI,
      - The instruments and processes that shape the money supply including the money multiplier and the role of central banks, and their impact on inflation.

b. Candidates should understand the following macroeconomic principles and how they relate to the business cycle:
   - The general accounting conventions and data sources used to track economic activity,
   - The simplified Keynesian model, without adjustments for changes in price level or money supply, as it applies to changes in GDP caused by changes in investment, government spending, and net exports,
   - The relationships of price level, money demand, total demand, and total supply under the Keynesian Model.

B. Interest Theory and Finance

1. Interest Theory

a. Candidates should have a practical knowledge of the theory of interest in both finite and continuous time. That knowledge should include how these concepts are used in the various annuity functions, and apply the concepts of present and accumulated value for various streams of cash flows as a basis for future use in: reserving, valuation, pricing, duration, asset/liability management, investment income, capital budgeting, and contingencies. Candidates should be able to perform present and accumulated value calculations using non-level interest rates.

b. Candidates should understand the following principles and applications of interest theory:
   - Accumulation function and special cases of simple and compound interest,
   - Nominal and effective interest and discount rates, and the force of interest—constant and varying,
   - Valuation of discrete and continuous streams of payments, including the case in which the interest conversion period differs from the payment period,
   - Determination of yield rates on investments and the time required to accumulate a given amount or repay a given loan amount,
   - Application of interest theory to amortization of lump sums, fixed income securities, depreciation, mortgages, etc.

c. Candidates should be able to use annuity functions in a broad finance context.

2. Finance

a. Candidates should understand and be able to analyze financial statements including balance sheets, income statements, and statements of cash flow. Candidates should be able to calculate discounted cash flow, internal rate of return, present and future values of bonds and apply the dividend growth model and price/earnings ratios concept to valuing stocks.

b. Candidates must be able to assess financial performance using net present value and the payback, discounted payback models, internal rate of return and profitability index models. Candidates should be able to analyze statements and identify what should be discounted, what other factors should be considered, and possible interactions between models.

c. Candidates should understand the trade-off between risk and return, the implications of the efficient market theory to the valuation of securities, and be able to perform the following:
   - Apply measures of portfolio risk, analyze the effects of diversification, systematic and unsystematic risks. Calculate portfolio risk and analyze the impact of individual securities on portfolio risk.
   - Identify efficient portfolios and apply the CAPM to firm cost of capital measures.
   - Value cash flows and analyze the certainty equivalent versus risk adjusted discount rates using assumptions for inflation, the term structure of interest rates and default risk correctly in their calculations.

d. Candidates should understand the following concepts and be able to use them to analyze financial structures:
   - Efficient markets and their effect on security prices,
   - Capital structure and the impact of financial leverage and long/short term financing policies on capital structure,
   - Sources of capital and the definitions of techniques for valuing basic options such as calls and puts.

e. Candidates should understand and be able to analyze financial performance by evaluating financial statements and financial ratios such as leverage, liquidity, profitability, market value ratios and analysis of accounting return versus economic return.

f. Candidates should understand and be able to apply the basic principles of option pricing theory including:
   - Black-Scholes formula,
   - Valuation of basic options.

Note: Concepts, principles and techniques needed for Course 2 are covered in the references listed below. Candidates and educators may use other references, but candidates should be very familiar with the notation, terminology and viewpoints espoused in the listed references.

Texts

- *Principles of Corporate Finance* (Sixth Edition), 2000, by Brealey, R.A. and Myers, S.C., Chapters 1, 4–21, and 28.
- *Price Theory and Application* (Fourth Edition), 1999, by Landsburg, S.E., Chapters 1–5, 7–8, 9 (9.3 only), 10–11, and 14.
- *Theory of Interest* (Second Edition), 1991, by Kellison, S.G., Chapters 1–3 (exclude 3.6, 3.7, 3.10), 4–5 (exclude 5.7–5.9), 6 (exclude 6.7–6.8), 7 (7.3–7.4 only), and 8 (8.5–8.7 only).

Study Notes

SNs for Courses 1–4 are available on our Web site. Hard copies may be purchased by using the Study Note and Published Reference order form in the back of this catalog.

Study Notes, textbook errata, tables, sample examinations, and updates and/or corrections to the Course of Reading can be found on the SOA Web site http://www.soa.org/eande/fall01_catalog/fall01_sn_info.html.

Code	Title
2-11-01#	Course 2 Introductory Study Note
2-10-00	May 2000 Course/Exam 2
2-12-00	November 2000 Course/Exam 2
2-10-01#	May 2001 Course/Exam 2
2-21-00	*Macroeconomics* (Third or Fourth Printing)

Course 3 Actuarial Models

This course is jointly administered by the SOA and CAS.

The examination for this course consists of four hours of multiple-choice questions and is identical to CAS Exam 3.

This course develops the candidate's knowledge of the theoretical basis of actuarial models and the application of those models to insurance and other financial risks. A thorough knowledge of calculus, probability and interest theory is assumed. A knowledge of risk management at the level of Course 1 is also assumed.

The candidate will be required to understand, in an actuarial context, what is meant by the word "model," how and why models are used, their advantages and their limitations. 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 in the study note package and in the examination booklet. These include values for the standard normal distribution, illustrative life tables, and abridged inventories of discrete and continuous probability distributions. These tables are also available on the SOA and CAS Web sites. Since they will be included with the examination, candidates will not be allowed to bring copies of the tables into the examination room.

Learning Objectives

Understanding Actuarial Models

The candidate is expected to understand the models and techniques listed below and to be able to apply them to solve problems set in a business context. The effects of regulations, laws, accounting practices and competition on the results produced by these models are not considered in this course. The candidate is expected to be able to:

1. Explain what a mathematical model is and, in particular, what an actuarial model can be.
2. Discuss the value of building models for such purposes as: forecasting, estimating the impact of making changes to the modeled situation, estimating the impact of external changes on the modeled situation.
3. Identify the models and methods available, and understand the difference between the models and the methods.
4. Explain the difference between a stochastic and a deterministic model and identify the advantages/disadvantages of each.
5. Understand that all models presented (e.g., survival models, stochastic processes, aggregate loss models) are closely related.
6. Formulate a model for the present value, with respect to an assumed interest rate structure, of a set of future contingent cash flows. The model may be stochastic or deterministic.
7. Determine the characteristics of the components and the effects of changes to the components of the model in 6. Components include:
   - a deterministic interest rate structure;
   - a scheme for the amounts of the cash flows;
   - a probability distribution of the times of the cash flows; and
   - the probability distribution of the present value of the set of cash flows.
8. 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.
   - Principles include: equivalence, exponential, standard deviation, variance, and percentile.
   - Models include: present value models based on 9-12 below.
   - Applications include: insurance, health care, credit risk, environmental risk, consumer behavior (e.g., subscriptions), and warranties.
9. Characterize discrete and continuous univariate probability distributions for failure time random variables in terms of the life table functions, l_x, q_x, p_x, ${}_nq_x$, ${}_np_x$, and ${}_{m|n}q_x$, the cumulative distribution function, the survival function, the probability density function and the hazard function (force of mortality), as appropriate.

   - 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.
- Express the impact of explanatory variables on a failure time distribution in terms of proportional hazards and accelerated failure time models.

10. Given the joint distribution of two failure times:
    - Calculate probabilities and moments associated with functions of these random variables.
    - 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 9, 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 9 in the case in which the two failure times are independent.
    - Characterize the joint distribution of two failure times, the joint life status and the last survivor status using the common shock model.
11. Characterize the joint distribution (pdf and cdf) of the time until failure and the cause of failure in the competing risk (multiple decrement) model, in terms of the functions
    $l_x^{(\tau)}, {}_t q_x^{(\tau)}, {}_t p_x^{(\tau)}, {}_t d_x^{(\tau)}, {}_t \mu_x^{(\tau)}(t)$.
    - Establish relations between the functions.
    - Given the joint distribution of the time of failure and the cause of failure, calculate probabilities and moments associated with functions of these random variables.
    - Apply assumptions about the pattern of failures between integral ages to obtain the associated (discrete) single decrement models from a discrete multiple decrement model as well as the discrete multiple decrement model that results from two or more discrete single decrement models.
12. Generalize the models of 9, 10, and 11 to multiple state models characterized in terms of transition probability functions or transition intensity functions (forces of transition).
13. Define a counting distribution (frequency distribution).
    - Characterize the following distributions in terms of their parameters and moments: Poisson, mixed Poisson, negative binomial, and binomial distributions.
    - Identify the applications for which these distributions are used and the reasons why they are used.
    - Given the parameters of a distribution, apply the distribution to an application.
14. Define a loss distribution.
    - Characterize the following families of distributions in terms of their parameters and moments: transformed beta, transformed gamma, inverse transformed gamma, lognormal and inverse Gaussian.
    - Apply the following techniques for creating new families of distributions: multiplication by a constant, raising to a power, exponentiation, and mixing.
    - Identify the applications in which these distributions are used and the reasons why they are used.
    - Given the parameters of a distribution, apply the distribution to an application.
15. Define a compound distribution.
16. Calculate probabilities associated with a compound distribution when the compounding distribution is a member of the families in 13, and the compounded distribution is discrete or a discretization of a continuous distribution.
17. Adjust the calculation of 16 for the impact of policy modifications such as deductibles, policy limits and coinsurance.
18. Define a stochastic process and distinguish between discrete-time and continuous-time processes.
19. Characterize a discrete-time Markov chain in terms of the transition probability matrix.
    - Use the Chapman-Kolmogorov equations to obtain probabilities associated with a discrete-time Markov chain.
    - Classify the states of a discrete-time Markov chain.
    - Calculate the limiting probabilities of a discrete-time Markov chain.
20. Define a counting process.
21. Characterize a Poisson process in terms of:

- the distribution of the waiting times between events,
- the distribution of the process increments,
- the behavior of the process over an infinitesimal time interval.

22. Define a nonhomogeneous Poisson process.
    - Calculate probabilities associated with numbers of events and time periods of interest.
23. Define a compound Poisson process.
    - Calculate moments associated with the value of the process at a given time.
    - Characterize the value of the process at a given time as a compound Poisson random variable.
24. Define a Brownian motion process.
    - Determine the distribution of the value of the process at any time.
    - Determine the distribution of a hitting time.
    - Calculate the probability that one hitting time will be smaller than another.
    - Define a Brownian motion process with drift and a geometric Brownian motion process.
25. For a discrete-time surplus process:
    - Calculate the probability of ruin within a finite time by a recursion relation.
    - Analyze the probability of ultimate ruin via the adjustment coefficient and establish bounds.
26. For a continuous-time Poisson surplus process:
    - Derive an expression for the probability of ruin assuming that the claim amounts are combinations of exponential random variables.
    - Calculate the probability that the surplus falls below its initial level, determine the deficit at the time this first occurs, and characterize the maximal aggregate loss as a compound geometric random variable.
    - Approximate the probability of ruin using the compound geometric recursion.
    - Analyze the probability of ruin: analytically (e.g., adjustment coefficient); numerically; and by establishing bounds.
    - Determine the characteristics of the distribution of the amount of surplus (deficit) at: first time below the initial level; and the lowest level (maximal aggregate loss).
27. Analyze the impact of reinsurance on the probability of ruin and the expected maximum aggregate loss of a surplus process.
28. Generate discrete random variables using basic simulation methods.
29. Generate continuous random variables using basic simulation methods.
30. Construct an algorithm to appropriately simulate outcomes under a stochastic model.

Applications of Actuarial Models

The candidate is expected to be able to apply the models above to business applications. The candidate should be able to determine an appropriate model for a given business problem and be able to determine quantities that are important in making business decisions, given the values of the model parameters. Relevant business applications include, but are not limited to:

- Premium (rate) for life insurance and annuity contracts,
- Premium (rate) for accident and health insurance contracts,
- Premium (rate) for casualty (liability) insurance contracts,
- Premium (rate) for property insurance contracts,
- Rates for coverages under group benefit plans,
- Loss reserves for insurance contracts,
- Benefit reserves for insurance contracts,
- Resident fees for Continuing Care Retirement Communities (CCRCs),
- Cost of a warranty for manufactured goods,
- Value of a financial instrument such as: a loan, a stock, an option, etc.,
- Risk classification,
- Solvency (ruin).

Note: Concepts, principles and techniques needed for Course 3 are covered in the references 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

- # *Actuarial Mathematics* (Second Edition), 1997, by Bowers, N.L., Gerber, H.U., Hickman, J.C., Jones, D.A. and Nesbitt, C.J., Chapters 3–4, Sections 5.1–5.4, 6.1–6.4, 7.1–7.6, 8.1–8.4, 9.1–9.5, 9.6 (excluding 9.6.2), 9.7–9.8, Chapter 10 (excluding 10.5.2 and 10.5.5), Sections 11.1–11.3 and Chapter 13.
  Note: Some notation presented in Chapter 13 of *Actuarial Mathematics* is introduced in Chapter 12. Candidates may find it helpful to refer to Chapter 12 when studying the readings in Chapters 13.
- *Introduction to Probability Models* (Seventh Edition), 2000, by Ross, S.M., Sections 2.8, 4.1–4.4, 4.5.1, 4.6, 5.3–5.4, 10.1–10.3.
- *Loss Models: From Data to Decisions,* 1998, by Klugman, S.A., Panjer, H.H., and Willmot, G.E., Sections 1.3, 1.4, 2.1, 2.2 (Definitions 2.10, 2.11, 2.12 and 2.13 only), 2.6 (pp. 74–77, 83 only), 2.7.1, 2.7.2 (excluding Example 2.40 and following), 2.7.3, 2.7.6, 2.10 (excluding 2.10.1 and following), 3.1, 3.2.1–3.2.2, 3.3.1–3.3.2, 3.4.1, 3.5 (through first full paragraph on page 222), 3.7 (excluding Example 3.15, Theorem 3.4, Example 3.18 and following), 3.10.1 (excluding Example 3.34 and following), 3.10.2 (excluding Example 3.38 and following), 4.1–4.3, 4.5, 4.6 (excluding Theorem 4.4 and Sections 4.6.2–4.6.5), 4.8, 6.2.3, 6.3.1, 6.3.2.1.
  Note: Some notation presented in *Loss Models: From Data to Decisions* is introduced in Section 3.6.1. The candidate may find it helpful to refer to Section 3.6.1 when studying the later sections of the text.
- *Simulation* (Second Edition), 1997, by Ross, S.M., Sections 3.1, 4.1–4.3, Chapter 5 (excluding 5.3 and 5.5).

Study Notes

SNs for Courses 1–4 are available on our Web site. Hard copies may be purchased by using the Study Note and Published Reference order form in the back of this catalog.

Study Notes, textbook errata, tables, sample examinations, and updates and/or corrections to the Course of Reading can be found on the SOA Web site http://www.soa.org/eande/fall01_catalog/fall01_sn_info.html**.**

Code	Title
3-11-01#	Course 3 Introductory Study Note
3-10-00	May 2000 Course/Exam 3
3-12-00	November 2000 Course/Exam 3
3-10-01#	May 2001 Course/Exam 3

Software

"Actuarial Models and Modeling: An Interactive Approach," 2000, by Jones, B.L., (CD-ROM) [ACTEX Publications]. Background reading. (This reference is not required but may be a valuable tool to explore actuarial models and modeling techniques relevant to this course.)

Course 4 Actuarial Modeling

This course is jointly administered by the SOA and CAS.

The examination for this course consists of four hours of multiple-choice questions and is identical to CAS Exam 4.

This course provides an introduction to modeling and covers important actuarial and statistical methods that are useful in modeling. A thorough knowledge of calculus, linear algebra, probability and mathematical statistics is assumed.

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 on Course 3.

A variety of tables will be provided to the candidate in the study note package and in the examination booklet. These include values for the standard normal distribution, chi-square distribution, *t* distribution, *F* distribution, and abridged inventories of discrete and continuous probability distributions. These tables are also available on the SOA and CAS Web sites. Since they will be included with the examination, candidates will not be allowed to bring copies of the tables into the examination room.

Learning Objectives

Understanding Actuarial Models

The candidate is expected to apply statistical methods to sample data to quantify and evaluate the models presented on Course 3 and to use the models to solve problems set in a business context. The effects of regulations, laws, accounting practices and competition on the results produced by these models are not considered in this course. The candidate is expected to be able to:

1. Identify the steps in the modeling process and discuss how they interrelate.
2. Identify the models and methods available, and understand the difference between the models and the methods.
3. Explain the difference between a stochastic and a deterministic model and identify the advantages/disadvantages of each.
4. Discuss the possible limitations imposed by the data available for input for constructing a model.
5. Understand that all models presented in Courses 3 and 4 are closely related. Apply models from more than one family (e.g., regression, stochastic process, time series) to a particular business application.
6. Identify the underlying assumptions implicit in each family of models and recognize which set(s) of assumptions are applicable to a given business application.
7. Estimate the parameters of a tabular failure time or loss distribution when the data is complete, or when it is incomplete, using maximum likelihood, method of moments, and Bayesian estimation.
8. Obtain nonparametric estimates for a failure time or loss distribution using the empirical distribution, the Kaplan-Meier estimator and the Nelson-Aalen estimator.
9. Construct the likelihood model needed to estimate the parameters of a parametric failure time or loss distribution regression model.
10. Construct the partial likelihood model needed to estimate the regression coefficients in a semiparametric failure time or loss distribution regression model.
11. Adjust an estimation based on the presentation of the sample data: complete, incomplete, censored, truncated, grouped, shifted.
12. Apply statistical tests to determine the acceptability of a fitted model:
    - Pearson's chi-square statistic
    - Likelihood ratio test
    - Kolmogorov-Smirnov statistic
13. For estimators, define the terms: efficiency, bias, consistency, mean squared error.
14. Calculate the least squares estimates of the parameters used in single and multiple linear regression models, and use knowledge of their distributions for hypothesis testing and development of confidence intervals.
15. Test a given linear regression model's fit to a given data set.

16. Assess the appropriateness of the linear regression model for a given data set by checking for such irregularities as heteroscedasticity, serial correlation, and multicollinearity.
17. Perform statistical tests to determine the presence of measurement error or specification error.
18. Develop deterministic forecasts from time series data, using simple extrapolation and moving average models, applying smoothing techniques and seasonal adjustment when appropriate.
19. Use the concept of the autocorrelation function of a stochastic process to test the process for stationarity.
20. Generate a forecast using the general ARIMA model and develop confidence intervals for the forecast.
21. Test the hypothesis that a given stochastic process is a random walk.
22. For an ARIMA process (including simpler models as special cases), estimate the model parameters, and perform appropriate diagnostic checks of the model.
23. Apply limited fluctuation (classical) credibility including criteria for both full and partial credibility.
24. Perform Bayesian analysis using discrete and continuous examples.
25. Apply the Buhlmann-Straub credibility model to basic situations. Understand the relationship to the Bayesian model.
26. Apply the conjugate prior in Bayesian analysis and Buhlmann-Straub credibility, and, in particular, to the Poisson-gamma model.
27. Apply empirical Bayesian methods in the nonparametric and semiparametric cases.
28. Compare and contrast the assumptions underlying limited fluctuation credibility, Bayesian analysis, and the Buhlmann-Straub credibility model.
29. Determine an appropriate number of simulations to perform in order to estimate a quantity of interest.
30. Quantify the variability of an estimate in the context of simulation.
31. Determine the bootstrap estimates of the mean squared error of an estimator.
32. Use basic simulation methods to validate a model.

Applications of Actuarial Models

The candidate is expected to apply the models presented in Course 3 and the statistical methods presented on this course to business applications. As discussed above, the candidate should be able to take data from a given application and determine a suitable model, including parameter estimates, for use in making business decisions related to the application. The candidate should be able to assess the variability of the parameter estimates and the goodness of fit of the model, and therefore provides an opinion on the confidence that should be given to the model output in making decisions.

Relevant business applications include, but are not limited to:

- Premium (rate) for life insurance and annuity contracts.
- Premium (rate) for accident and health insurance contracts.
- Premium (rate) for casualty (liability) insurance contracts.
- Premium (rate) for property insurance contracts.
- Rates for coverages under group benefit plans.
- Loss reserves for insurance contracts.
- Benefit reserves for insurance contracts.
- Resident fees for Continuing Care Retirement Communities (CCRCs).
- Cost of a warranty for manufactured goods.
- Value of a financial instrument such as: a loan, a stock, an option, etc.
- Risk classification.

Note: Concepts, principles and techniques needed for Course 4 are covered in the references 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

- *Econometric Models and Economic Forecasts* (Fourth Edition), 1998, by Pindyck, R.S. and Rubinfeld, D.L., Chapters 3–6, 15–18.
- *Foundations of Casualty Actuarial Science* (Fourth Edition), 2001, Casualty Actuarial Society, Chapter 8, "Credibility", by Mahler, H.C., and Dean C.G., (Section 2 only). **(Available as SN 4-21-01).**
- # *Loss Models: From Data to Decisions,* 1998, by Klugman, S.A., Panjer, H.H. and Willmot, G.E., Sections 2.2–2.3, 2.4 (excluding method of scoring), 2.5 (excluding 2.5.3), 2.6, 2.8 (excluding pages 111 and following), 2.9–2.10, 3.2.3, 3.3.3, 3.4.2, 3.5, 3.10.1 (beginning with Example 3.34), 5.4–5.5 (excluding 5.4.6 and 5.5.3).
- *Simulation* (Second Edition), 1997, by Ross, S.M., Chapters 7 and 9 (excluding 9.4).
- *Survival Analysis,* 1997, by Klein, J.P. and Moeschberger, M.L., Chapters 4, 5 (exclude 5.2), 6 (exclude 6.4), 7 (Sections 7.1–7.3 only), and 8.
  Note: Some notation and definitions used in *Survival Analysis* are introduced in Chapters 2 and 3 (excluding Section 3.6). The candidate may find it helpful to refer to these chapters when studying later sections of the text.

Alternative Courses of Readings for Credibility Theory

The candidate may use either Course of Reading shown below. The candidate will not be tested on the details of derivations in either Course of Reading.

A. This Course of Reading is included in the **Texts** section above:

- *Foundations of Casualty Actuarial Science* (Fourth Edition), 2001, Casualty Actuarial Society, Chapter 8, "Credibility", by Mahler, H.C., and Dean C.G., (Section 2 only). **(Available as SN 4-21-01).**
- *Loss Models: From Data to Decisions,* 1998, by Klugman, S.A., Panjer, H.H., and Willmot, G.E., Sections 5.4–5.5 (excluding 5.4.6 and 5.5.3).

B. As an alternative to "A" above, the following readings may be used:

- *Foundations of Casualty Actuarial Science* (Fourth Edition), 2001, Casualty Actuarial Society, Chapter 8, "Credibility", by Mahler, H.C., and Dean C.G., (Sections 2-5 only). **(Available as SN 4-21-01).**
- *Loss Models: From Data to Decisions,* 1998, by Klugman, S.A., Panjer, H.H., and Willmot, G.E., Sections 5.4.4 and 5.5 (excluding 5.5.3).

Background Readings

Before commencing a formal study of credibility theory candidates may want to read the references listed below for a non-technical exposition of the basic ideas underlying credibility theory. Section 5.2 of *Loss Models: From Data to Decisions* contains a review of basic statistical concepts that some candidates may find useful.

- "An Examination of Credibility Concepts", *Proceedings of the Casualty Actuarial Society,* LXVIII, pp. 195–212. **(Available as SN 4-22-01).**
- *Foundations of Casualty Actuarial Science* (Fourth Edition), 2001, Casualty Actuarial Society, Chapter 8, "Credibility", by Mahler, H.C., and Dean C.G., (Section 1 only). **(Available as SN 4-21-01).**
- *Loss Models: From Data to Decisions,* 1998, by Klugman, S.A., Panjer, H.H., and Willmot, G.E., Sections 1.5, 5.1 and 5.2.

Study Notes

SNs for Courses 1–4 are available on our Web site. Hard copies may be purchased by using the Study Note and Published Reference order form in the back of this catalog.

Study Notes, textbook errata, tables, sample examinations, and updates and/or corrections to the Course of Reading can be found on the SOA Web site http://www.soa.org/eande/fall01_catalog/fall01_sn_info.html.

Code	Title
4-11-01#	Course 4 Introductory Study Note
4-10-00	May 2000 Course/Exam 4
4-12-00	November 2000 Course/Exam 4

4-10-01# May 2001 Course/Exam 4
4-21-01# Credibility
4-22-01# An Examination of Credibility Concepts (Background only.)

Software

"Actuarial Models and Modeling: An Interactive Approach," 2000, by Jones, B.L., (CD-ROM) [ACTEX Publications]. Background reading. (This reference is not required but may be a valuable tool to explore actuarial models and modeling techniques relevant to this course.)

Course 5 Application of Basic Actuarial Principals

The examination for this course consists of five hours of multiple-choice and written-answer questions.

This course develops the candidate's knowledge of basic actuarial principles applicable to a variety of financial security systems: life, health, property & casualty insurance, annuities, and retirement systems. The candidate will be required to understand the purpose of these systems, the design and development of financial security products, the concepts of anti-selection and risk classification factors, and the effects of regulation and taxation on these issues. The course will develop the candidate's knowledge of principles and practices applicable to the determination of premiums and rates and the valuation and funding of these financial security systems.

Learning Objectives

A. Basic Principles of Design

After studying the material, the candidate should be able to:

1. Explain how financial security programs interact to combat financial insecurity.
    a. Explain the meaning of financial insecurity.
    b. Explain why financial security programs are necessary.
    c. Identify which programs are better suited to solve specific problems.
2. Analyze the Product Development Process.
    a. Determine why an institution would develop certain plans or products.
        - Determine if a plan or product is necessary and marketable.
        - Determine if this plan or product fits into the culture of the institution.
        - Evaluate the competitive issues involved with developing this plan or product.
    b. Determine the steps necessary to develop these plans or products.
        - Evaluate the setting of assumptions.
        - Calculate asset shares.
        - Analyze the results of product pricing.
        - Determine profitability measures.
    c. Deduce the effect of regulation and taxation on the design of these plans or products.
        - Explain why insurance regulation and taxation are necessary.
        - Evaluate the effectiveness of specific regulation and taxation on financial security programs.
        - Structure financial security programs to take into account the effect of specified taxation and regulation assumptions.
3. Distinguish between the various types of financial security products including:
    a. Life insurance (Individual, Group)
        - Identify various products.
        - Explain unique product features.
        - Select the best product to use given a set of criteria.
    b. Health (Individual, Group, Government sponsored)
        - Identify various products.
        - Explain unique product features.
        - Select the best product to use given a set of criteria.
    c. Retirement plans (Individual annuities, Employer sponsored, Government sponsored)
        - Identify various products.
        - Explain unique product features.
        - Select the best product to use given a set of criteria.
    d. Property and Casualty insurance
        - Identify various products.
        - Explain unique product features.
        - Select the best product to use given a set of criteria.
    e. Non-traditional (Warranty)
        - Explain unique product features.
        - Select the best product to use given a set of criteria.
4. Compare the various methods of distributing these products and the effectiveness of each method.

a. Compare current distribution systems.
b. Determine which distribution system is best in various situations.
c. Evaluate fictitious distribution systems.

Basic Principles of Risk Classification

After studying the material, the candidate should be able to:

1. Explain anti-selection.
2. Evaluate the risk classification factors used for:

Life Insurance (Individual, Group)

- Explain the relative value of specific factors.
- Identify the effect of a specific set of factors.
- Evaluate the cost/benefit to gathering certain criteria.

b. Health (Individual, Group, Government sponsored)

- Explain the relative value of specific factors.
- Identify the effect of a specific set of factors.
- Identify the effect of regulation on gathering information.
- Evaluate the cost/benefit to gathering certain criteria.

c. Retirement plans (Individual annuities, Employer sponsored, Government sponsored)

- Explain why certain factors are necessary and their relative value.
- Identify the effect of a specific set of factors.
- Identify the effect of regulation on gathering information.
- Evaluate the cost/benefit to gathering certain criteria.

d. Property and Casualty insurance

- Explain the relative value of specific factors.
- Identify the effect of a specific set of factors.
- Evaluate the cost/benefit to gathering certain criteria.

e. Non-traditional (Warranty, Mortality Model for Systems Projects)

- Explain the relative value of specific factors.
- Identify the effect of a specific set of factors.

3. Determine the methods of gathering necessary information.
   a. Compare the effectiveness of various gathering techniques.
   b. Identify which techniques are better given a specific situation.
4. Analyze the effect of risk classification on the design process.
   a. Identify how risk classification affects product design.
   b. Identify how risk classification affects distribution.

Basic Principles of Pricing/Ratemaking/Funding

After studying the material, the candidate should be able to:

1. Describe the objectives for the various coverages.
2. Evaluate the assumptions used in pricing.
   a. Claims (frequency and severity)
      - Decide what assumptions should be considered.
      - Explain the relative value of certain assumptions.
   b. Expenses/taxes
      - Decide what assumptions should be considered.
      - Explain the relative value of certain assumptions.
   c. Interest
      - Decide what assumptions should be considered.
      - Explain the relative value of certain assumptions.
   d. Decrements (lapse/termination, retirement, death, disability)
      - Decide what assumptions should be considered.
      - Explain the relative value of certain assumptions.

3. Describe the major pricing/funding techniques/methods for:

a. Life Insurance (Individual, Group)
b. Health (Individual, Group)
c. Retirement Plans (Individual, Group)
d. Property and Casualty insurance

4. Evaluate the profit/surplus implications for pricing/funding.
   a. Life insurance (Individual, Group)
      - Describe methods to evaluate pricing.
      - Develop different types of profit/surplus measures.
   b. Health (Individual, Group)
      - Describe methods to evaluate pricing.
      - Develop different types of profit/surplus measures.
   c. Retirement Plans
      - Describe methods to evaluate cost/funding.
   d. Property and Casualty insurance
      - Describe methods to evaluate pricing.
      - Develop different types of profit/surplus measures.

Basic Principles of Valuation

After studying the material, the candidate should be able to:

1. Explain, in general, what a valuation is and the different purposes for performing a valuation.
   a. Explain ways in which regulation can impact valuation.
   b. Explain non-regulation purposes for valuation.
2. Evaluate valuation techniques and methodology.
   a. Prospective (PVFB—PVFP)
      - Determine the actuarial value resulting from applying the methodology.
      - Evaluate the purposes of which the technique/method is appropriate.
      - Explain the limitations or implications of the valuation technique.
      - Evaluate the choice of assumptions.
      - Explain how the results can be verified.
   b. Retrospective (accumulation type/deposit fund liabilities)
      - Determine the actuarial value resulting from applying the methodology.
      - Evaluate the purposes of which the technique/method is appropriate.
      - Explain the limitations or implications of the valuation technique.
      - Evaluate the choice of assumptions.
      - Explain how the results can be verified.
   c. Claims Reserves
      - Determine the actuarial value resulting from applying the methodology.
      - Evaluate the purposes of which the technique/method is appropriate.
      - Explain the limitations or implications of the valuation technique.
      - Evaluate the choice of assumptions.
      - Explain how the results can be verified.
3. Interpret the results of the valuation.
   a. Describe the components of a report/opinion.
   b. Explain the variances or limitations of the results.

Texts

- *A Problem Solving Approach to Pension Funding and Valuation,* (Second Edition), 1996, by Aitken, W.H., Chapters 1–4.
- *Fundamentals of Private Pensions,* (Seventh Edition), 1996, by McGill, D.M., Brown, K.N., Healy, J.J., and Schieber, S.J., Chapters 22–24.
- *Group Insurance,* (Third Edition), 2000, edited by Bluhm, W.F., Chapters 1, 5–10, 14–15, 19–21, 23, 30–31, and 36.

- † *Individual Health Insurance,* 1988*,* by O'Grady, F.T., Chapters 1, 2 (sections 2.1.6–2.1.8, and 2.4), 3, 4 (sections 4.6–4.7)
- *Life Insurance Products and Finance,* 2000, by Atkinson, D., and Dallas, J., Chapters 1–11 and 13.
- † *Introduction to Ratemaking and Loss Reserving for Property and Casualty Insurance,* (Second Edition), 2001, by Brown, R.L., Chapters 1–4.

Candidates may also use:

- *Introduction to Ratemaking and Loss Reserving for Property and Casualty Insurance,*1993, by Brown, R.L., Chapters 1–4.

Study Notes

Code	**Title**
5-11-01#	Course 5 Introductory Study Note
5-09-00	Sample Examination #1
5-10-00#	November 2000 Course 5 Examination
5-21-00	Introduction to Retirement Income Security Systems
5-22-00	The Purpose of Regulation
5-23-00	Principles of Taxation
5-24-00	Introduction to Financial Security Systems

Course 7 Applied Modeling

This course introduces the candidate to the practical considerations of modeling through an intensive seminar using a case study format. Candidates are required to pass a pre-test to be eligible to take the Course 7 seminar. The interactive approach of the seminar will require candidates to draw upon knowledge from the basic courses and learn applied modeling skills in a hands-on environment. The seminar also emphasizes communication skills, teamwork and the synthesis of subjects in an applied setting.

Learning Objectives

The candidate must be able to demonstrate the ability to use models to solve business problems and to communicate results. The primary emphasis of the course is on the modeling process, solving business problems and effective communication. Technical knowledge of a limited number of models will provide the context for meeting the primary objectives.

Within the context of these overall objectives, the candidate must be able to demonstrate knowledge and capability in the following areas:

A. The Context of Modeling

The candidate must know the following:

- What a model is, including the following:
  - What is an actuarial model,
  - A general understanding of the types of models used in actuarial practice such as survival models, credibility models, risk theory models, ruin theory models, option pricing models, cash flow and cash flow testing models and nontraditional models, and
  - A more in depth understanding of a specified list of models required for the seminar case studies,
- The modeling process, including the feedback loop,
- Common principles underlying models,
- When a modeling approach is appropriate,
- The limitations of the modeling process, and
- The sources of error in the modeling process such as the following:
  - Process error (pure risk),
  - Statistical estimation error,
  - Model selection error,
  - The model versus the universe, and
  - Assumption error including explicit and implicit assumptions about the future environment.

B. Model Design, Selection and Set-up

The candidate should be able to select and apply appropriate models to solve business problems, and to justify his/her selection, choose and justify reasonable and appropriate assumptions, specify and justify parameters of any parametric models selected, and also understand the following:

- The explicit and implicit advantages and limitations of various models,
- How the model selection process is affected by data quality and accessibility, available resources and output requirements,
- How professional and regulatory requirements affect the modeling process,
- The difference between explicit and implicit assumptions, and how to perform sensitivity analysis,
- The relationships between the choice of model and the results obtained.

C. Input Data Selection and Analysis

The candidate must be able to solve business problems both where the data are provided and where the candidate has to find the data and should understand the following:

- The importance of balancing data quality, accessibility, credibility and relevance,
- The sources of data, and variety, reliability, and availability of data from each source,
- The impact of data quality, and
- How to evaluate data quality.

D. Analysis of Results

The candidate should be able to analyze and understand the results of the modeling process including the following:

- The reasonableness of the results,
- The sensitivity of the output to changes in input, and
- The useful life of the model, its input and its assumptions.

E. Communicating the Modeling Process

The candidate must be able to clearly and accurately communicate the modeling process and the solution of the business problem. This communication should include the following:

- Understanding the nature of audience,
- The professional requirements (standards of practice),
- The regulatory requirements,
- Have appropriate format and medium, and
- Maintain sufficient internal documentation.

Pre-Test

Prior to application for the seminar, candidates must pass a pre-test on the readings outlined below. Successfully passing the pre-test assures that candidates have sufficient background on the modeling process (beyond passing Courses 1–6) to attend and participate in an applied modeling seminar.

Candidates must attend a Course 7 seminar (from which a passing score is received) within 12 months of their successful pre-test administration. If the candidate is unsuccessful in passing the seminar within 12 months, the candidate will be required to pass another pre-test.

Administered on the first Friday of the following months: February, April, June, August, October, and December, the pre-test is open book (limited to the material on the syllabus), and two hours in length. A combination of multiple-choice, true-false and written-answer questions will be used. After finding an FSA to supervise the administration of the pre-test, the candidate must submit a pre-test application to the SOA. The registration deadline is exactly two weeks prior to each administration of the pre-test.

The syllabus for the pre-test is guaranteed to be in effect for the period covered by the current catalog and for a period of at least five weeks after the release of the next catalog.

Pre-test Readings
Study Notes

Code	Title
7P-21-00	Long Range Forecasting—From Crystal Ball to Computer
7P-22-00	Pitfalls in Human Research—Ten Pivotal Points
7P-23-00	The Modeling Process
7P-24-00	Current Actuarial Modeling Practice and Related Issues and Questions
7P-25-00	Model Uncertainty, Data Mining and Statistical Inference
7P-26-00	Applied Futurism—An Introduction for Actuaries
7P-27-00	Probabilistic Development Factor Models with Applications to Loss Reserve Variability, Prediction Intervals, and Risk Based Capital
7P-28-00	Evaluating the Risks of Modeling Assumptions Used in Risk Measurement
7P-29-00	The Strategic Uses of Value at Risk: Long-Term Capital Management for Property Casualty Insurers
7P-30-00	ASB Exposure Draft, Proposed Actuarial Standard of Practice: The Use of Models with Nonactuarial Components
7P-31-00	A Mechanic's Perspective to Model Building
7P-32-00	Some Guidelines on Data Quality Verification
7P-33-00	Actuarial Standard of Practice No. 23—Data Quality
7P-34-00	CIA Discussion Draft—Consolidated Standards of Practice
7P-35-00	Designing Effective Graphs
7P-36-00	Report Writing: Communicating Data Analysis Results

7P-37-00 Report Writing Aids and Author's Checklist of Editorial Guidelines
7P-39-00 ASB Interpretative Opinion 3: Professional Communications of Actuaries
7P-40-00 Trended, Projected Ultimate Losses

Seminar

To register for a seminar, the candidate must meet the following qualifications:

- Has passed Courses 1–6 or has passed five of the six courses and written the final examination for this group, awaiting results. However, priority will be given to those candidates who have already passed all six courses. Candidates who apply while awaiting May/November results will be put on an Ineligible List until grades are released, at which time registration status will be updated. Candidates will **not** be allowed to attend a seminar until successfully completing Courses 1–6.
- Has attended and passed the pre-test within the 12 months prior to the seminar dates requested on the seminar registration form. Candidates may submit a seminar application when registering for the pre-test, however, priority will be given to those candidates who have already passed the pre-test. Candidates who apply for a seminar prior to passing the pre-test will be put on an Ineligible List until grades are released, at which time registration status will be updated. Candidates passing the pre-test at that time will be moved to registered status, space permitting. Candidates will **not** be allowed to attend a seminar until successfully completing the pre-test. (Candidates who have submitted a seminar application and who are subsequently unsuccessful on the pre-test will have their seminar registration canceled and registration fee refunded, less a $100 processing fee. These candidates will not be permitted to register for another seminar until they have registered for another pre-test.)

Note: Candidates who have submitted a seminar registration and fee prior to the registration deadline will receive the advance reading for the seminar regardless of their registration status, including those on the Wait List or Ineligible List.

Ineligible List—Candidates registering for a Course 7 seminar who are not yet fully eligible to attend (i.e., have not yet passed Courses 1–6 and the Course 7 Pre-test) will be placed on the ineligible list.

Wait List—Fully eligible candidates registering for a Course 7 seminar that is currently at capacity for attendance will be placed on the wait list.

Enrollment will be on a first-come, first-served basis. The registration deadline for the seminar is exactly four weeks prior to the first day of the desired seminar.

The seminar includes a Common Core segment featuring case studies that illustrate various aspects of the modeling process. A second segment, the Extended Case Study segment, features presentation and discussion of a single general or practice-area-specific case study, covering all of the major components of the modeling process. The focus of this segment varies from seminar to seminar. The content of this segment of a practice area specialty seminar will focus on application(s) in a single practice area. The content of this portion of a general seminar will be designed so that no particular practice area background is significantly advantageous. During the fourth day of the seminar, candidates individually complete the project assignment (general or practice-area specific) which is the means of evaluation of the candidates' comprehension of the seminar content.

Reading requirements, data sets and exercises will be provided in advance of the seminar so that the candidates can practice the needed skills and verify that their computer hardware and software have the required capabilities.

All candidates are required to bring a laptop computer to the seminar and will be responsible for the proper operation of the laptop during the seminar. The seminar facility will have outlets for plugging in the laptop. The minimum and recommended configurations for the laptop are subject to change. Current requirements and configurations can be found on the Course 7 page of the SOA Web site at http://www.soa.org/eande/c7_appliedmodeling.html. Printers with dedicated computers will be provided. Candidates may also bring an electronic calculator for use during the seminar.

Course 7 Prerequisite Waiver

Experienced candidates wishing to complete the Course 7 Pre-test and Seminar prior to writing their last examination of Courses 1–6 and who can demonstrate completion of at least 4 years of responsible actuarial work experience, may submit a written request for an exemption form fully completing the

prerequisites for Course 7. Such requests should be submitted to the SOA Ombudsperson at the SOA office address.

Notice for Unsuccessful Candidates

Candidates who are unsuccessful in a previous Course 7 seminar attempt have the option of attending a Course 7 seminar beginning with the Extended Case Study portion of the seminar on the afternoon of the second day. Candidates are advised that in order to benefit from the educational value of the entire course, the Course 7 Committee encourages candidates who were unsuccessful in a previous Course 7 seminar attempt to attend the entire seminar. However, recognizing that candidates may believe that they have fully mastered the content of the Common Core segment, repeat candidates may choose to attend beginning in the afternoon of the second day. Regardless of the option selected, there will be no fee reduction. A previously unsuccessful candidate electing to attend this abbreviated version of the seminar must include a written request when submitting the seminar registration form.

Course 8 Finance

The examination for this course consists of six hours of written-answer questions.

Prior to sitting for Course 8 Finance, the candidate is expected to have obtained a basic knowledge of accounting, investment mathematics, and the principles of taxation, through a combination of study and work experience.

This course trains candidates in the financial aspects of operating and evaluating a business, with particular emphasis on the business of financial intermediaries. This includes gaining an understanding of several subjects, including accounting, corporate finance, investment banking, strategic planning, financial statement analysis, and the operations of financial areas.

Because each of these areas, and finance in general, supports or directly involves decision-making in situations where risk is an integral element, actuarial science is of considerable relevance to this subject matter. Conversely, by expanding the candidate's knowledge of finance, a wider understanding of various forms of financial risk can be achieved. The candidate should therefore develop a facility with both actuarial techniques and more general financial approaches to dealing with risk, as well as how such approaches relate to one another. This includes identification and measurement of financial risks, means available to assume or shift such risks, and determining the appropriate price for a transfer of risk.

Finance is an area characterized by rapid innovation as well as the normal uncertainty changes of any marketplace. The course will prepare candidates for such change by balancing practical aspects of the current financial environment with their theoretical underpinnings.

A "Course Overview" study note (8F-20-01) has been prepared for this course. It is intended to give candidates additional insights into the Course of Reading as well as a possible approach to take when studying the various sections of the course.

Course 8 Finance includes a case study for the examination. The case study will be distributed as Study Note 8F-13-01 in the study note package. The case study will also be included in the examination booklet. Candidates will not be allowed to bring their copy of the case study into the examination room.

Learning Objectives

A. Corporate Finance

1. The candidate should be able to recommend a specific legal form of organization, and justify his choice.
2. The candidate should be able to recommend specific firm governance measures, and justify his recommendations.
3. The candidate should be able to identify sources of agency costs, and to recommend how to minimize them.
4. The candidate should be able to calculate the cost of capital for a venture using the most appropriate method for given circumstances, and justify his choice of method.

B. Capital Management

1. The candidate should be familiar with the major sectors of the capital markets and how their characteristics impact investors, issuers, and other parties.
2. The candidate should be able to describe the roles of financial intermediaries and how they add value to their customers.
3. The candidate should be able to identify regulatory capital requirements and describe how they affect decisions.
4. The candidate should be able to identify the goals and methodologies of rating agencies and explain how their ratings affect financial institutions.
5. The candidate should be able to explain how behavioral characteristics of individuals or firms affect the capital management process.
6. The candidate should be able to recommend an appropriate dividend policy for a firm, and justify his recommendation.
7. The candidate should be able to identify indirect costs and explain how to incorporate them into the evaluation of a project.

8. The candidate should be able to describe the steps necessary to obtain funds for a given project or firm from any specified source.
9. The candidate should be able to identify the circumstances, the justifications, and the effects of a merger or acquisition.
10. The candidate should be able to identify the reasons, the methods, and the costs of a potential demutualization.

C. Financial Risk Management

1. The candidate should be able to explain how to choose among risky alternatives with given return distributions.
2. The candidate should be able to discuss the risks assumed by each party to a given project.
3. The candidate should be able to identify and describe means for transferring risk to a third party, and to identify the costs and benefits of doing so.
4. The candidate should be able to define risk metrics to quantify major types of risk exposure, and explain how each can be incorporated into a governance/control process.
5. The candidate should be able to identify and describe means for reducing risk without transferring it, and determine how its performance may be evaluated.
6. The candidate should be able to describe how the performance of a given firm or venture may be evaluated against its objectives.
7. The candidate should be able to describe how derivatives, synthetic securities, and financial contracting may be used to reduce risk, or to assign it to the party most able to bear it.

D. Financial Strategy

1. The candidate should be able to describe an appropriate decision-making process for a given firm or venture.
2. The candidate should be able to recommend an optimal capital structure, and how to implement it, for a given business or strategy, and to justify his/her recommendation.
3. The candidate should be able to describe how financial risks and opportunities influence the selection of firm strategy.

Texts

- *Corporate Finance Theory,* 1997, by Megginson, W.L., Chapters 6–9.
- *Life, Health, & Annuity Reinsurance,* (Second Edition), 1995, by Tiller, J.E., Jr. and Tiller, D.F., Chapters 5 and 16–17.
- *Measuring Financial Performance in the Life Insurance Industry*, LOMA, Chapters 1–8, (include appendix A, exclude appendix B).
- # *The Fair Value of Insurance Business,* 2000, by Vanderhoof, I.T., and Altman, E.I., Chapters 1 and 4.
- † *Taxes and Business Strategy: A Planning Approach*, (Second Edition), by Wolfson, M., and Scholes, M. (The required chapters will be listed in the introductory study note and on our Web site.)
- † *The New Corporate Finance: Where Theory Meets Practice,* (Third Edition), 2001, by Chew, D., Jr., Sections: Introduction (pp. xv–xxiv), 1.01, 2.06, 2.09, 3.12, 3.14, 4.18, 4.20, 4.22, 4.25, 4.26, 5.27, 5.28, 5.31, 6.36, 6.37, 6.44.

Candidates may also use:

- *The New Corporate Finance: Where Theory Meets Practice,* (Second Edition), 1999, by Chew, D., Jr., Sections: Introduction (pp. xv–xxiv), 1.01, 2.09, 2.11, 3.14, 3.17, 4.21, 4.23–4.24, 4.30, 4.32, 5.33, 5.36, 5.39, 6.44, 6.47 and 6.54.

Study Notes

Code		Title
8F-11-01	#	Course 8F Introductory Study Note
8F-09-00		Sample Examination #1
8F-10-00	#	November 2000 Course 8F Examination
8F-13-01	#	Case Study
8F-20-01	#	Course 8F Overview
8F-100-00		Solvency Measurement for Property-Liability Risk-Based Capital Applications

8F-102-00 Valuation Actuary Practice Notes for Life and Health Insurance Appointed Actuaries
8F-103-01# Demystifying Demutualization—A Canadian Capital Markets Perspective
8F-202-00 One System of Financial Intermediation: A New Paradigm
8F-203-00 Risk Management by Insurers: An Analysis of the Process
8F-207-01# Life Insurer Risk-Based Capital: An Option Pricing Approach
8F-208-01# Allocation of Risk Capital in Financial Institutions
8F-300-00 Cash Flow Analysis Techniques
8F-302-00 Income-Based Reserves
8F-303-00 Solvency-Based Reserves
8F-304-00 OSFI Guidelines, Derivatives Best Practices
8F-305-01# Variable Annuities—"no loss" Propositions
8F-306-01# General American Life Can't Pay Investors, Looks at Suitors
8F-307-01# Total Return Approach to Performance Measurement
8F-308-01# Banc One Corporation—Asset and Liability Management
8F-309-01# Managing Currency Exposures in International Portfolios
8F-310-01# Risk^2: Measuring the Risk in Value at Risk
8F-311-01# VAR: Seductive But Dangerous
8F-312-01# CreditMetrics—Technical Document (Chapters 1 and 2)
8F-313-01# Disciplined Decisions—Aligning Strategy with the Financial Markets
8F-314-01# One Step in the Right Direction: The New C-3a Risk-Based Capital Component
8F-315-01# OSFI Guideline on Segregated Fund Guarantee Risk
8F-400-00 Dynamic Financial Condition Analysis Handbook Chapters 1 (background only), 8 and appendix A.
8F-401-00 Shortfall Approach to the Creditor's Decision: How Much Leverage Can a Firm Support?
8F-402-00 Financial Decision-Making in Markets and Firms: A Behavioral Perspective
8F-403-01# Dynamic Financial Models of Property-Casualty Insurers
8F-404-01# Insurance Company Rating Agencies: Practice Descriptions

Published References

"Strategic Management of Life Insurance Company Surplus," (exclude appendix and discussion), TSA XXXVIII, pp. 105–116.
CIA Educational Note: "C-1 Risk," May 1997
CIA Educational Note: "Management, Risks, Regulation and Accounting of Derivatives," Chapter 3 Only

Course 8 Health, Group Life and Managed Care

The examination for this course consists of six hours of written-answer questions.

This course consists of a core component and two extensions. The material for the core component will be common to every candidate sitting for this examination. However, each candidate will select only one of the two extensions for individual study.

Both the core component and the two extensions address actuarial principles within the context of plan design, data analysis and rating, and financial management. The core component also addresses issues related to administrative and delivery systems. The common elements of these general principles will be addressed in the core component of the examination as they relate to group life, both individual and group coverages of disability income, dental, medical and long-term care insurance, and the financing and delivery of medical and dental services provided in a managed care environment.

The course extension on Health and Group Life ("Group Extension") provides a more in-depth treatment of the application of these actuarial principles to group life and both individual and group disability income, dental, medical and long-term care insurance products.

The course extension on Managed Care ("Managed Care Extension") provides a more in-depth treatment of the application of actuarial principles to both the medical and dental managed care product environments. This course extension focuses primarily on the managed care delivery systems as currently implemented in the United States.

A "Course Overview" study note (8GM-20-01) has been prepared for this course. It is intended to give candidates additional insights into the Course of Reading as well as a possible approach to take when studying the various sections of the course.

Course 8 Health, Group Life and Managed Care includes a case study for the core component of the examination (8GM-13-01), as well as one for each separate extension. The case studies for the extensions will be distributed as Study Note 8G-13-01 for the Group Extension and 8M-13-01 for the Managed Care Extension in the study note package. Case studies will also be included in the examination booklet. Candidates will not be allowed to bring their copy of the case studies into the examination room.

Learning Objectives

A. Plan Design

Upon completion of this course the candidate should be able to:

1. Design plans that address the financial protection needs of plan participants.
2. Design plans that address the employee, employer, provider and insurer objectives with regard to the various elements of plan design and health organization design.
3. Describe the perceived value of a given plan design.
4. Understand the primary public policy issues relating to plan design and formulate how regulations might address such issues.
5. Given a case study of a benefit plan design and hypothetical regulations,
   a. Describe alternative plan design modifications to comply with regulations, and
   b. Analyze the impact of such changes on participants, employers, providers and insurers.
6. Compare the various methods of organizing and funding health care providers.
7. Describe how performance risk can be passed from employers and insurers to the delivery system.
8. Given a case study of a benefit plan and of a particular delivery system,
   a. Describe alternative arrangements for allocating financial risks between employers, insurers and providers.
   b. Recommend and justify a particular financing arrangement.

B. Data and Cost Analysis and Rating

Upon completion of this course the candidate should be able to:

1. Describe the uses of various sources of data.
2. Describe the limitations of various sources of data and recommend ways to address such limitations when using the data in a given situation.
3. Analyze experience data from a case study and identify causes of changes.
4. Analyze the economic value of a given plan design.

5. Given a specific plan design and data,
    a. Calculate the plan-wide costs, revenue targets or premiums for specific risks.
    b. Calculate and evaluate the value and trend of claim and expense costs.
    c. Evaluate and justify credibility methods applied to the data.
6. Assess the impact of changing economic conditions and assumptions on the value of a given plan design.
7. Describe and compare underwriting methods.
8. Recommend and justify the use of a particular underwriting method in a given situation.
9. Identify selection issues and the potential impact arising from the use of a given rating and underwriting method in a multiple selection setting.
10. Describe the various outcome measurements used to ensure effective financial performance of a health plan and the various components of the delivery system, analyze the effectiveness of the given entity, and describe the alternative arrangements for addressing areas of poor financial performance.
11. Candidates studying for the Managed Care extension should be able to:
    a. Describe the capitation and risk share models.
    b. Given a case study, calculate an appropriate capitation rate.

C. Financial Management

Upon completion of this course the candidate should be able to:

1. Describe the needs for capital and methods for evaluating capital requirements.
2. Analyze the need for, recommend and justify which type of reinsurance is appropriate in a given situation.
3. Given a case study with experience data, calculate and opine on the liabilities of an employer, provider and insurer.
4. Describe the impact that taxation and regulation have on the financial management of group life and health organizations.

D. Administration and Delivery Systems

Upon completion of this course the candidate should be able to:

1. Describe the various outcome measurements used to ensure effective administrative and quality health care performance of a health plan and the various components of the delivery system, analyze the effectiveness of the given entity, and describe the alternative arrangements for addressing areas of poor financial performance.
2. Describe the impact of the various administrative services on:
    a. the expenses to provide and deliver a benefit plan,
    b. the participant's satisfaction,
    c. the employer's satisfaction, and
    d. the provider's satisfaction.

CORE

Texts

- *Actuarial Issues in the Fee-for Service/Prepaid Medical Group,* (Second Edition), 1993, by Sutton, H.L., and Sorbo, A.J., Chapters 8–9.
- *Canadian Handbook of Flexible Benefits,* (Second Edition), 1996, by McKay, R.J., editor, Chapters 2–4, 5 (pp. 65–82 and 93–96 only) and 15.
- *Group Insurance,* (Third Edition), 2000, by Bluhm, W.F., editor, Chapters 3, 17, 24–25, 28–29, 35, and 38.
- # *Individual Health Insurance*, 1988, by O'Grady, F.T., Chapters 2.1.6–2.1.8 (background only), 3 (background only), 4, 6–8.
- † *The Managed Health Care Handbook,* (Fourth Edition), 2001, by Kongstvedt, P.R., Chapters 37, 38 (excluding pp. 714–717 and 733–734), and 41–43.

Study Notes

Code	Title
8GM-13-01#	Core Case Study
8GM-20-01#	Course 8GM Overview
8GM-100-00	Design and Funding of Other Post-Employment Benefits (pp. 1–20; 39–57 only)
8GM-101-00	Principles of Health Insurance Regulation (appendices included for background only)
8GM-102-00	Dental Coverages
8GM-103-00	Designing a Managed Care Dental Plan
8GM-200-00	Financial Management of Health Insurance: Forecasting, Monitoring and Analyzing Health Plan Experience
8GM-201-00	Underwriting Issues for Alternative Healthcare Delivery Systems
8GM-202-00	Monitoring and Projecting Pricing Trends in a Managed Care Environment
8GM-203-00	Health Risk Assessment and Health Risk Adjustment—Current Initiatives
8GM-204-00	Health Plan Performance Measurement Reports: A Report of the Society of Actuaries Medical Effectiveness Task Force
8GM-205-00	Group Medical Insurance Large Claims Database Collection and Analysis (Executive Summary and pp. 1–7)
8GM-206-00	Variation by Duration in Small Group Medical Insurance Claims (pp. 1–15 and Exhibits II, III, IV & V)
8GM-207-00	An Examination of Credibility Concepts
8GM-300-00	US Health Insurance Taxation
8GM-301-00	Taxation—Canadian
8GM-302-00	Taxation of Life Insurance Products
8GM-303-00	FAS 106 and 112 (Introduction and FAS 106 sections only, pp. 1–23)
8GM-304-00	Reinsurance for Group Accident & Health Insurance
8GM-305-00	Health Reserves (Sections 1–6 only, pp. 1–45)

Published References

"Cumulative Anti-Selection Theory," TSA XXXIV, pp. 215–246

"Required Surplus for the Insurance Risk for Certain Lines of Group Insurance," TSA XXXVI, pp. 9–34, D37–47

#ASP No. 5, "Incurred Health and Disability Claims," December 2000

ASP No. 8, "Regulatory Filings for Rates and Financial Projections for Health Plans," January 1989

ASP No. 18, "Long-Term Care Insurance," January 1999

ASP No. 23, "Data Quality," July 1993

HEALTH AND GROUP LIFE EXTENSION

Texts

- *Canadian Handbook of Flexible Benefits,* (Second Edition), 1996, by McKay, R.J., editor, Chapters 7–10, 13–14, and 21.

Study Notes

Code	Title
8G-11-01#	Course 8G Introductory Study Note
8G-09-00	Sample Examination #1
8G-10-00#	November 2000 Course 8G Examination
8G-13-01#	Health and Group Life Case Study
8GM-303-00	FAS 106 and 112 (FAS 112 section only, pp. 24–31)
8G-500-00	Direct Marketing
8G-501-00	Consumer Issues—Employee Choice
8G-502-00	Group Long-Term-Care Topics
8G-600-00	Group Disability Insurance
8G-601-00	Pricing Long Term Care
8G-602-00	Stop Loss 101: Self Insurance for Employee Benefits (pp. 4–22 background only)
8G-603-00	Pricing Medicare Supplement Benefits
8G-700-00	Group Life Insurance

Published References

"Flexible Benefits Update," RSA 17, No. 3A, pp. 971–990.

"Long-Term-Care Intercompany Study: 1984–1991 Experience," TSA Reports, 1993–1994, pp. 43–121.

"Long-Term-Care Insurance Valuation Methods," TSA XLVII, pp. 611–684.

MANAGED CARE EXTENSION

Texts

- *Actuarial Issues in the Fee-for Service/Prepaid Medical Group,* (Second Edition), 1993, by Sutton, H.L., and Sorbo, A.J., Chapters 1–6 and 11.
- † *The Managed Health Care Handbook,* (Fourth Edition), 2001, by Kongstvedt, P.R., Chapters 7–8, 11–12, 18, 20, 22–23, 25, 29, 30, 32 (exclude pp. 610–614), 47 (exclude pp. 917–919), 55 (pp. 1060–1072 only), 64 and 69 (pp. 1322–1341 only).

Study Notes

Code	Title
8M-11-01#	Course 8M Introductory Study Note
8M-09-00	Sample Examination #1
8M-10-00#	November 2000 Course 8M Examination
8M-13-01#	Managed Care Case Study
8GM-305-00	Health Reserves (Section 7, pp. 46–55)
8M-500-00	Health Insurance Market Reforms: What They Can and Cannot Do
8M-600-00	Calculated Risk—A Provider's Guide to Assessing and Controlling the Financial Risk of Managed Care (Chapters 2 and 4 only, pp. 7–20 and 33–41)
8M-700-00	Reinsurance in the Managed Care Environment

Published References

#AAA Public Policy Monograph, July 2000, "Medicare Reform: Providing Prescription Drug Coverage for Medicare Beneficiaries", (Sections I and II only)

ASP No. 16, "Actuarial Practice Concerning Health Maintenance Organizations and Other Managed-Care Health Plans"

Course 8 Individual Insurance

The examination for this course consists of six hours of written-answer questions.

This course assumes that the candidate is familiar with the material in Courses 1 through 7, particularly Courses 2 through 6. The syllabus material for Course 8 Individual Insurance contains several chapters from the text *Life Insurance Products and Finance.* The remaining chapters of this text are included in the Course 5 syllabus. The portion of the text which does not appear in the Course 8 syllabus is considered a prerequisite for the Course 8 Individual Insurance examination. The candidate is strongly encouraged to review the entire text during his/her preparation for the Course 8 Individual Insurance.

Course 8 Individual Insurance includes a case study for the examination. The case study will be distributed as Study Note 8I-13-01 in the Study Note package. The case study will also be included in the examination booklet. Candidates will not be allowed to bring their copy of the case study into the examination room.

Learning Objectives

A. Marketing of individual life insurance and annuity products

Topics include the marketing process, distribution methods, impact of market research and distribution method on product design and pricing, and cost disclosure. The candidate should be able to:

1. Understand the marketing process.
   a. objectives of marketing
   b. strategy formation
   c. contribution margin and profit optimization
   d. sources of marketing information
2. Understand alternative methods of distribution for individual life and annuity products.
   a. know the primary methods: traditional agency and non-traditional
   b. primary compensation features of each system
3. Integrate market research and distribution method choices into the design and pricing of individual life and annuity products.
   a. use of market research in product design
   b. appropriate assumption for selection pricing
4. Design appropriate product illustrations and disclosures.

B. Pricing

Topics include the selection of pricing assumptions, profit goals and policyholder equity, models used to measure profitability and to determine gross premiums, dividends and non-guaranteed elements, and the use of reinsurance in pricing. The candidate should be able to:

1. Select assumptions needed to price individual life insurance and annuity products (mortality, investment return, expenses, and lapses/withdrawal/loans/terminations), and understand how such assumptions are developed.
2. Understand shareholder expectations and the principles of policyholder equity, and their impact on the development of profit goals and the pricing process.
3. Develop and use models to compute gross premiums, compute dividends, set non-guaranteed elements, and measure the profitability of individual life insurance and annuity products.
4. Evaluate the uses of reinsurance in product pricing.
5. Apply alternative pricing strategies and understand the issues involved in changing prices.

C. Valuation and Financial Statements

Topics include the different purposes of valuation, the selection of valuation assumptions, the use of reserve audit methods, asset/liability analysis, financial reporting, and the professional role of the valuation actuary. The candidate should be able to:

1. Understand the basic types of valuations of an insurance company's liabilities, including the ability to select valuation methods.
   a. Calculate reserve liabilities as part of a financial system with emphasis on solvency for all individual life insurance and annuity products identified in the course of reading.

b. Calculate reserve liabilities as part of a financial system with emphasis on fair value of liabilities for all individual life insurance and annuity products identified in the course of reading.
c. Calculate reserve liabilities as part of a financial system with emphasis on the allocation of income to period in which it is earned for all individual and annuity products identified in the course of reading.

2. Understand the selection of valuation assumptions for the basic types of valuations of an insurance company's liabilities.
3. Devise and use reserve audit methods.
4. Perform asset/liability analysis.
5. Prepare simplified financial statements.
6. Understand the professional role of the valuation/appointed actuary in the valuation process.

D. Product Development and Design

Topics include the stages of the development process, the impact of changing economic conditions and marketing environments on product design, applicable legal and taxation principles, communicating results, and pricing design issues associated with various products and benefits. The candidate should be able to:

1. Understand the stages of the product development process.
2. Apply actuarial nonforfeiture principles and practices to the determination of nonforfeiture methodology, options, and values.
3. Communicate interim and ultimate results of product designs to internal and external constituencies, incorporating professional requirements and standards.
4. For both the life insurance and annuity product groups:
   a. Recognize the standard and unique features of the products.
   b. Identify the risks involved in offering such products and coverages.
   c. Manage the risks so identified.
5. Life insurance products include ordinary, term, universal, and variable life. Annuity products include deferred, immediate, and variable annuity basic products and advanced annuity features.

Texts

- # *Life Insurance Products and Finance,* 2000, by Atkinson, D., and Dallas, J., Chapters 7, 11, and 14–16.
- *Marketing for Actuaries,* 2000, by LaPorte, P., editor, Chapters I–VII.
- *Marketing Management*, (Tenth Edition), 2000, by Kotler, P., Chapters 8–9, 11, and 15–16.

Study Notes

Code	Title
8I-11-01#	Course 8I Introductory Study Note
8I-09-00	Sample Examination #1
8I-10-00#	November 2000 Course 8I Examination
8I-13-01#	Case Study
8I-100-00	Product Development Trends
8I-101-00	Life Insurance and Annuity Nonforfeiture Practices
8I-102-00	Life and Annuity Products and Features
8I-103-01#	Advanced Policyholder Dividends
8I-200-00	Experience Assumptions for Individual Life Insurance and Annuities
8I-201-00	Gross Premiums for Disability Waiver Benefits
8I-202-00	Variable Annuity Minimum Death Benefits—A Monte Carlo Pricing Approach
8I-203-00	Equity-Indexed Annuities—New Territory on the Efficient Frontier
8I-204-01#	Report of the Society of Actuaries Task Force on Preferred Underwriting, September 1998 (i–viii)
8I-300-00	Solvency Based Reserves
8I-301-00	Income-Based Reserves
8I-302-00	CLHIA Accounting and Financial Reporting for Life Insurance Enterprises (include appendices)
8I-303-00	Actuarial Review of Reserves and other Annual Statement Liabilities (exclude

appendices A–E)
8I-304-00 Value Based Financial Measurement
8I-305-00 Life Insurance Company Statutory Valuation (sections 1–4 only)
8I-306-00 Cash Flow Analysis Techniques
8I-308-00 Regulator's Perspective on Actuarial Opinions and Valuations
8I-309-01# Management Reports and Reports to Regulatory Bodies

Published References

"An Expanded Financial Structure for Ordinary Dividends," TSA XXXIII, pp. 313–365.
"Pricing in a Return-on-Equity Environment," TSA XXXIX, pp. 257–271.
"Strategic Management of Life Insurance Company Surplus," TSA XXXVIII, pp. 105–116.
ASP No. 1, "The Redetermination (or Determination) of Non-Guaranteed Charges and/or Other Benefits for Life Insurance and Annuity Contracts", July 1990
ASP No. 7, "Performing Cash Flow Testing for Insurers", July 1991
ASP No. 14, "When to do Cash Flow Testing for Life and Health Insurance Companies", July 1990
ASP No. 21, "The Actuary's Responsibility to the Auditor", April 1993
ASP No. 22, "Statutory Statements of Opinion Based on Asset Adequacy Analysis," by Appointed Actuaries for Life or Health Insurers, April 1993
ASP No. 23, "Data Quality", July 1993
CIA Education Note: "Dynamic Capital Adequacy Testing—Life and Property and Casualty," June 1999
CIA, "Provision for Adverse Deviations"
CIA, "Recommendations—Dividend Determination and Illustration"
CIA, Valuation Technique Paper #6, "Expected Mortality Experience for Individual Insurance"

Course 8 Investments

The examination for this course consists of six hours of written-answer questions.

Course 8 Investments includes a case study for the examination. The case study will be distributed as Study Note 8V-13-01 in the Study Note package. The case study will also be included in the examination booklet. Candidates will not be allowed to bring their copy of the case study into the examination room.

A "Course Overview" study note (8V-20-01) has been prepared for this course. It is intended to give candidates additional insights into the Course of Reading as well as a possible approach to take when studying the various sections of this course.

Learning Objectives

A. Portfolio Management

1. The candidate should be able to describe the characteristics of and markets for traditional asset classes (e.g., government bonds, corporate bonds, equities and money market) as well as specialty asset classes (e.g., real estate, commercial mortgages, mortgage-backed securities, international fixed income and international equity). Such characteristics would include expected returns and particular risks of the asset class. The candidate should be able to evaluate and recommend the suitability of these assets for particular portfolios.
2. The candidate should be able to describe the characteristics and payoff structures of derivatives and options including more complex derivatives (e.g., equity, currency, credit and commodity derivatives) and exotic options (e.g., swaptions, spread options and compound options). The candidate should be able to apply these investments in a portfolio context and perform appropriate analysis of their impact on those portfolios.
3. The candidate should have advanced knowledge of portfolio theories such as CAPM (Capital Asset Pricing Model), APT (Arbitrage Pricing Theory), Markowitz efficient frontiers (Modern Portfolio Theory), and Downside Risk (Post-Modern Portfolio Theory). The candidate should be able to apply different types of asset allocation strategies such as immunization, active versus passive management and static/dynamic strategies.
4. The candidate should be able to identify, analyze and manage various risks in investment markets. These will include currency risk, credit risk, liquidity risk, interest rate risk, derivative specific risks, and catastrophic risks. The candidate should know how to assess corporate risk exposure and be familiar with concepts such as risk-based capital, value-at-risk, earnings-at-risk and ruin theory and their application in managing risk.

B. Option Pricing Techniques

1. The candidate should be able to develop and apply the theory behind interest rate scenario generators, for continuous and discrete interest rate model solutions, as well as continuous and discrete equity market model solutions and the application of economic scenarios.
2. The candidate should be able to choose economic assumptions for option pricing, including volatilities and correlations, and identify and apply the concepts of behavioral finance with respect to option holder behavior, including the assessment of optimal behavior, real behavior, model behavior, and empirical studies.
3. The candidate should be able to apply option pricing theory, including the interpretation of model output, and the utilization of that output such as in the use of hedge ratios, duration and convexity analysis, sensitivity testing and decision making.
4. The candidate should be able to identify the limitations behind various option pricing techniques with respect to model misspecification, execution time, impact of expenses and taxes, credit risk and other risks. The candidate should apply tools which can be used to deal with the limitations.

C. Asset-Liability Management

1. The candidate should have a working knowledge of the nature of various liabilities which are to be supported, including insurance company obligations (life/health and property/casualty), bank liabilities, and pension and benefit funds. The candidate should be able to incorporate the parameters affecting the client's needs (e.g., funding objectives, risk/return dynamics, regulatory

environment, concerns about solvency and/or capital strength, cost of capital and management constraints) in an asset-liability management framework.

2. The candidate should be able to develop a portfolio which appropriately supports the underlying liabilities. This will include setting portfolio policy and objectives, specifying asset selection criteria, incorporating capital market expectations, and risk management strategies including the use of hedging instruments and/or derivatives.
3. The candidate should be able to select and apply investment models to achieve asset-liability management. This will include the selection of appropriate financial assumptions, portfolio optimization techniques, quantification of optionality in the assets or liabilities, and the validation of the models.
4. The candidate should have an in-depth knowledge of risk measures important in ALM with an emphasis on those related to interest rate risk. This would include a thorough understanding of the concept and application of measures such as duration and its extensions (e.g., option-adjusted and key-rate durations measures), as well as the concept and measurement of convexity. The candidate should be able to describe the strengths and limitations of various ALM techniques such as immunization, stochastic scenario testing, etc.
5. The candidate should understand the relationship between various approaches for measurement of asset and liability valuation and be able to explain how these approaches can affect investment management decision-making.
6. The candidate should be able to establish appropriate benchmarks for the portfolio and understand how to measure performance against these benchmarks. This will include the use of external or liability-specific benchmarks and the application of concepts such as cash flow matching, transfer-pricing, performance attribution and efficient frontiers.
7. The candidate should be able to review case studies of actual or hypothetical situations and show how to develop and implement an appropriate ALM strategy to meet the portfolio requirements.

Texts

- # *Advanced Interest Rates and Currency Swaps: State-of-the-Art Products, Strategies & Risk Management Applications, 1994*, by Dattatreya, R., and Hotta, K., Chapters 6, 13, and 15.
- *Financial Economics,* 1998, by Panjer, H., Chapters 7 and 9.
- # *Handbook of Mortgage Backed Securities,* (Fourth Edition), 1995, by Fabozzi, F.J., Chapters 8–9, 18–19, and 30. **(Out of print.) [Available as Study Note 8V-119-00.]**
- † *Investment Management for Insurers,* 1999, Babbel, D., and Fabozzi, F.J., Chapters 1, 4, 10–11, 17, 19, 25–26.
- # *Options, Futures, and Other Derivatives,* (Fourth Edition), 2000, by Hull, J.C., Chapters 7–11, 13–18, 19 (19.1–19.5 only), 20 (exclude 20.7), and 23.
- † *The Fair Value of Insurance Business,* 2000, Vanderhoof, I.T., and Altman, E.I., Chapters 1 and 4.
- † *The New Corporate Finance: Where Theory Meets Practice*, (Third Edition), 2001, by Chew, D., Jr., Articles I.3, V. 28, V. 30, and V. 32.

Candidates may also use:

- *The New Corporate Finance: Where Theory Meets Practice*, (Second Edition), 1999, by Chew, D., Jr., Articles I.5, V. 36–37, and V. 42.

Study Notes

Code	Title
8V-11-01#	Course 8V Introductory Study Note
8V-09-00	Sample Examination #1
8V-10-00#	November 2000 Course 8V Examination
8V-13-01#	Case Study
8V-20-01#	Course 8V Overview
8V-100-00	What Determines Cap Rates on Real Estate?
8V-101-00	Risk and Return in Real Estate: Evidence from a Real Estate Stock Index
8V-102-00	Currency Hedging Rules for Plan Sponsors
8V-103-00	Managing Currency Exposures in International Portfolios
8V-104-00	Liquidity and Trading Issues in Equity Markets
8V-105-00	Risks in Global Investing

8V-106-00 Political Risk in the World Economies
8V-107-00 Real Estate Risk Measurement: Comparing Commercial Property with Common Stocks
8V-108-00 The US Real Estate Market
8V-109-00 The Real Estate Investment Management Firm
8V-110-00 Resolving the Equity Duration Paradox
8V-113-00 Asset Allocation in a Downside-Risk Framework
8V-114-00 Derivatives: Practice and Principles
8V-115-00 Key Rate Durations: Measures of Interest Rate Risks
8V-116-00 Risk^2: Measuring the Risk in Value at Risk
8V-117-00 VAR: Seductive but Dangerous
8V-118-01# Algorithmics Study Note
8V-119-00 Chapters 8, 9, 18, 19 and 30 of "The Handbook of Mortgage Backed Securities"
8V-201-00 Financial Decision-Making in Markets and Firms: A Behavioral Perspective
8V-202-00 Quantitative Strategies Research Notes, Model Risk
8V-203-01# Current Issues: Options
8V-301-00 Equity-Indexed Life Products
8V-302-00 Stable Value Investments
8V-303-00 Asset-Liability Management for a Going Concern
8V-304-00 Portfolio Selection Based on Return, Risk, and Relative Performance
8V-305-00 Strategies and Techniques for Asset-Liability Management: An Overview
8V-306-00 A Numerical Examination of Asset-Liability Management Strategies
8V-307-00 Asset Performance and Surplus Control: a Dual-Shortfall Approach
8V-311-00 Total Return Approach to Performance Measurement
8V-312-01# AAA Final Report of the Equity Indexed Products Task Force
8V-313-01# Variable Annuities—"no loss" Propositions
8V-314-01# Performance Measurement Using Transfer Pricing

Published References

"An Excess Spread Approach to Nonparticipating Insurance Products," TSA XLII, pp. 231–258.

Course 8 Retirement Benefits

The examination for this course consists of six hours of written-answer questions, administered in two segments.

This course assumes that the candidate is familiar with the material in Courses 1 through 7, particularly Courses 2 through 6.

This course will be administered in two segments: 1) Pension Funding Mathematics; and 2) Comprehensive Segment. These segments are independent and may be taken in different years. However, the Comprehensive Segment will presume knowledge of the topics covered in the Pension Funding Mathematics Segment. Candidates with credit for the Enrolled Actuaries' examination EA-2, Segment A (EA-1, Segment B before 1/1/01), will automatically receive credit for the Course 8 Retirement Benefits Pension Funding Mathematics Segment.

A "Course Overview" study note (8R-20-01) has been prepared for the comprehensive segment of this course. It is intended to give candidates additional insights into the Course of Reading as well as a possible approach to take when studying the various sections of the course. Course 8 Retirement Benefits Comprehensive Segment includes a case study for the examination. The case study will be distributed as Study Note 8R-13-01 in the Study Note package. The case study will also be included in the examination booklet. Candidates will not be allowed to bring their copy of the case study into the examination room.

Note: The Course of Reading for this course may include commutation functions that are not included in the second edition of *Actuarial Mathematics*. Candidates who want a summary of commutation functions and their use can order Study Note 600-99-99, "Commutation Functions", from the SOA.

Learning Objectives

Upon completion of this course:

A. The candidate will be able to advise plan sponsors on the integration of plan design, plan funding, regulation, accounting standards, investment strategy, corporate finance and compensation goals.

B. The candidate will be able to advise employers on appropriate retirement plan designs to meet their goals.
   1. The candidate will be able to advise plan sponsors on a plan design/features that will reflect the sponsor's environment, industry, philosophy, labor force objectives and total compensation objectives to salaried, hourly, unionized and executive employees.
   2. The candidate will be familiar with government provided retirement income benefits and be able to integrate these benefits with pension plan designs in order to meet specified goals.
   3. The candidate should be familiar with the variety of forms for providing retirement benefits and their appropriateness for different environments, including private sector, public sector and multiemployer.
   4. The candidate should be familiar with the different circumstances and variety of forms for providing retirement benefits to salaried, hourly, unionized and executive employees.
   5. The candidate will understand how plan design is affected by the regulatory environment.

C. The candidate will be able to manage the process of valuing retirement benefit plans.
   1. The candidate will be able to perform periodic valuations of ongoing plans, analyzing annual gains/losses, and calculating benefits on an actuarial equivalence basis.
   2. The candidate will be able to choose appropriate assumptions for a pension plan valuation and discuss the effect the assumptions have on the resulting values.
   3. The candidate will be able to advise retirement plan sponsors on the funding costs and accounting for these plans including alternatives to meet the sponsor's goals.
   4. The candidate will be able to select an appropriate asset valuation method in line with the sponsor's investment policy and funding goals.
   5. The candidate will be able to discuss the pattern of cost recognition that arises under a variety of funding methods.

6. The candidate will be able to perform valuations for special purposes, including plan termination/windup, mergers, spinoffs, conversions between defined benefit and defined contribution, projections for long range planning, and costing proposed changes.
7. The candidate will be able to assess data quality, appropriate adjustments and related issues.
8. The candidate will be able to perform these functions for plans funded through any medium and sponsored by private employers, industry groups or governments.
9. The candidate will be able to communicate valuation results appropriately.

D. The candidate should have an understanding of the regulatory environment for retirement plans. The candidate should be knowledgeable on the principles of legislative restrictions on plan design, plan amendment, plan termination/windup, plan merger or spinoff, reporting requirements, members' rights, plan funding, and the coordination of contribution limits for all tax-assisted retirement savings. The candidate should understand the tax implications, to the plan sponsor and the members, of retirement plan designs and funding alternatives.

E. The candidate should understand the duties and concerns of pension plan sponsors regarding the proper investment of fund assets.
1. The candidate will be able to consult with clients on the advantages of different types and combinations of investment vehicles for providing retirement benefits given the particulars of the client's financial circumstances, philosophy, industry, workforce and benefit package.
2. The candidate will understand the appropriate management of retirement funds.
3. The candidate will be able to advise the plan sponsor on the actuarial considerations in an appropriate statement of investment policy.

F. The candidate will understand the actuary's professional obligation and applicable standards of practice.

PENSION FUNDING MATHEMATICS SEGMENT (1½ hours)

Text
- *Pension Mathematics for Actuaries*, (Second Edition), 1990, by Anderson, A.W., Chapters 1–4, 6 and 7.

Study Notes

Code	Title
8P-11-01#	Course 8P Introductory Study Note
8P-09-00	Sample Examination #1
8P-10-00#	November 2000 Course 8P Examination
8P-21-00	Pension Funding Exercises (background only)
8P-22-00	Addendum to 8P-21-00 (background only)
8P-23-00	Actuarial Equivalent Benefits

COMPREHENSIVE SEGMENT (4½ hours)

Texts
- *Fundamentals of Private Pensions,* (Seventh Edition), 1996, by McGill, D.M., Brown, K.N., Haley, J.J., and Schieber, S.J., Chapters 10–12, 14, 16–18, 20–21, and 27.
- *Managing Investment Portfolios*, (Second Edition), 1990, by Maginn, J.L., and Tuttle, D.L., Chapters 7 and 14.
- *Mercer Handbook of Canadian Pension & Benefit Plans,* (Eleventh Edition),1996, by Hall, G.M., Chapters 1–2, 7–8, and 10.
- *Pension Planning,* (Eighth Edition), 1997, by Allen, E.T., Melone, J.J., Rosenbloom, J.S., and Vanderhei, J.L., Chapters 4–5, 18, 20–21, and 23 (pp. 429–446 only).
- *† Pensions in the Public Sector,* 2000, edited by Mitchell, O.S., Hustead, E.C., Chapters 1–2, 5, 9–10, and 17.
- *Private Pension Policies in Industrialized Countries—A Comparative Analysis,* 1995, by Turner, J., and Watanabe, N., (exclude Chapters 8–9.)

- *Return Targets and Shortfall Risks,* 1996, by Bader, L.N., Kogelman, S., and Leibowitz, M.L., Chapters 2–4, 7, and 10–11.

Study Notes

Code	Title
8R-11-01#	Course 8R Introductory Study Note
8R-09-00	Sample Examination #1
8R-10-00#	November 2000 Course 8R Examination
8R-13-01#	Case Study
8R-20-01#	Course 8R Overview
8R-100-00	Understanding Defined Benefit & Defined Pension Plans (without §457, §403(b) and appendices)
8R-101-00	Beyond Pensions: How Should Business Define New Objectives for the Private Retirement System
8R-102-00	Caught Between Demographics and the Deficit: How Can Retirement Plans Meet the Challenges Ahead
8R-103-00	Should Variable Pay Count Toward Benefits Calculations?
8R-105-00	Adopting a Defined Contribution Plan: Issues for Pension Plan Sponsors
8R-107-00	Retirement Programs for Executives: A Primer
8R-108-00	Retirement Programs for Executives: Negotiating Your Retirement Package
8R-109-00	Non-Qualified Plans (pp. 1–17 for background only)
8R-110-00	Multiemployer Plans
8R-111-00	Innovations in Canadian Pension Plan Design
8R-112-00	The Trend to a Global TCN Benefits Program for US Companies
8R-113-00	Providing Benefits for Expatriates and Third Country Nationals
8R-114-00	Labor Market Plans
8R-115-00	Design and Funding of Other Post-Employment Benefits (exclude pp. 20–38)
8R-116-01#	Integration with Social Security
8R-200-00	Pension Topics (exclude I-III)
8R-201-00	Symposium on Pension Funding Adequacy
8R-202-00	Pension Projections
8R-203-00	An Introduction to Duration for Pension Actuaries
8R-204-00	Back to the Future
8R-205-00	CIA Memorandum: Report of the Task Force on Application of Cash Flow Techniques to Pension Plans
8R-206-00	Mortality Tables for Pension Plans
8R-207-00	Selection of Interest Assumptions for Pension Plan Valuation
8R-208-00	Selection of Actuarial Assumption (pp. 1–26 only)
8R-209-00	Valuation of Pension Benefits for Disabled Participants (Chapters 3, 4 and Appendices A & B are for background only)
8R-210-00	Controlling the FAS 87 Balance Sheet Impact by Integrating Funding Expensing and Asset Policies
8R-212-00	Pension Accounting, International, US and Canadian Standards
8R-213-00	IASC Issues Paper—Retirement Benefit and Other Employee Benefit Costs (paragraphs 41–51, 65–86, 98, 104–105, 107–146, 153–165, 167–170, 173–176, 182–195, 200–212, 216–220, 232–240, 245–259, 262–265, 270–292, 308–310, 318–327 only) (Appendices—background only)
8R-216-00	Pension Plan Financial Statements, CICA 4100 and FAS 35
8R-217-00	SEC on Discount Rates
8R-218-00	Pension Issues in Corporate Sales, Mergers & Acquisitions
8R-219-00	Pension Surplus and Deficit Funding: Funding Multi-Employer Plans
8R-220-00	FAS 106 and FAS 112 (exclude pp. 14–15, and 20–23 background only)
8R-221-01#	Asset Valuation Methods Survey Report (Excerpt)
8R-222-01#	IAS 19 (Excluding pp. 1–6, paragraphs 8–23, 126–158 and Appendix 3) (Appendices 1–2 background only)

8R-301-00 Introduction and Overview of Retirement Plan Investments
8R-302-01# Fiduciary Liability Issues for Selection of Investments
8R-303-00 Pension Issues for Insurance Companies—GICs and Asset/Liability Matching

8R-304-00 The Successful Use of Benchmark Portfolios: A Case Study
8R-305-00 Statement of Investment Policies for Defined-Benefit and Defined-Contribution Plans

Published References

ASP No. 4, “Measuring Pension Obligations,” October 1993
ASP No. 23, “Data Quality,” July 1993
ASP No. 27, “Selection of Economic Assumptions for Measuring Pension Obligations,” December 1996
ASP No. 35, “Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations,” December 1999
CIA Standard of Practice for Valuation of Pension Plans (January 1994)
CIA Recommendations for the Computation of Transfer Values from Registered Pension Plans

Professional Development Requirement

The Professional Development (PD) requirement of the SOA curriculum serves to cover topics that the practitioner will need to learn throughout his/her career, including those that are country-specific, regulatory, or otherwise transitory in nature. Satisfying the PD requirement occurs after completing the formal course of examinations and precedes eligibility for the Fellowship Admissions Course to attain the FSA designation. While this catalog attempts to cover all major facets of the PD requirement, candidates are advised to read carefully the information provided on the PD page of the SOA Web site for more in-depth coverage of the requirement, helpful sample information, approved program lists and any updates regarding the PD process.

The candidate must obtain a minimum of 50 units of eligible education within a 25-month period. The depth of topic treatment for PD must go beyond the level covered on Courses 1–8. At least 35 units must come from the completion of suitable formal professional development programs relevant to the chosen practice area (seminars and symposia, meeting sessions, professional examinations, and courses).

A project demonstrating effective application of professional skills relative to a legitimate issue within the chosen practice area must be completed for 15 units of credit. The candidate must also communicate the relevant aspects of that project. Eligible programs and projects are to be selected in accordance with SOA guidelines and the following overall educational objective approved by the Board of Governors.

> *Upon completion of the Professional Development (PD) requirement, the candidate will have a deeper understanding of the technical, legal, ethical, cultural, professional and practical parameters that apply to the chosen practice area, within the geographic territory or jurisdiction of the practice of the candidate.*

PD candidates will first file an initial PD plan package for SOA acceptance, followed by an executed plan package when all required elements are complete**. No plan may be filed until the candidate has received a passing score for all of Courses 1-8**. Application earlier in the process will be automatically denied; this restriction minimizes nonproductive effort by candidates, advisors, and SOA volunteers on PD plans in which a significant part of the program may expire before the candidate actually meets the prerequisite requirements for PD. Candidates are permitted to include up to 15 units of PD credit from activities occurring prior to the date the initial plan is accepted by the SOA.

Process—Initial Plan

A. The candidate will identify his/her chosen practice area, territory of jurisdiction of practice, if applicable, and type of professional environment (business connection) in which the candidate plans to practice.

B. The candidate will recruit an advisor with a minimum of 5 years experience as an FSA. (Candidate may include non-FSAs in an advisory panel if head of panel is a five-year FSA.) Advisor and candidate agree to and sign the PD Letter of Commitment (form available in back of catalog). Both are subject to the SOA's Code of Professional Conduct.

C. In consultation with the advisor, educational objectives for the candidate's PD plan are identified that will address the candidate's own areas of professional interest, responsibility, long-term goals, or educational needs. Based on these objectives, the candidate may either adapt a Model Plan, or where the candidate elects to go outside the standard practice areas (or make use of programs not suitable for inclusion in a Model Plan), the candidate may develop a customized initial plan. The Model Plans are intended to be used primarily as a framework and candidates should consider tailoring the model plan objectives and topics to be covered to best fit their own PD needs.

   Whether a candidate develops a PD plan that is based on the framework of the Model Plans or develops a completely customized plan, the educational objectives articulated by the candidate should be clear and cohesive. A candidate may choose to provide a well-articulated overall educational objective or several, clearly integrated educational objectives.

   The initial plan document must include specific educational objectives, topics to be covered and an outline of the planned project. A candidate may include in the initial plan the general nature of the

activities when known. Candidate and advisor then agree upon and sign the appropriate initial plan document for the candidate.

Initial PD plans filed with the SOA will receive initial acceptance as of the date eligibility processing at the SOA office is completed. Responsibility for ensuring the quality and appropriateness of initial plans will rest directly with the candidate and advisor. The SOA will send an acknowledgement (via email when possible) that the plan has been received and confirm acceptance date. Candidates may attain up to 15 units prior to the date their initial submission is accepted. When confirmation of plan acceptance is received, candidates can proceed with the additional activity required to completely execute their plans.

The PD Committee will explicitly review initial plans only at the request of the candidate and advisor. Candidates may want to request a formal review of their initial PD plans if the proposed plan includes unique features such that the candidate is uncertain about executed plan acceptance. Candidates are advised that because their initial plans have not been reviewed and approved by the PD review groups, the review of their final executed plans may more frequently result in requests for justification or clarification of educational objectives as well as formal program elements (including the research project).

D. The candidate files an initial plan package with the SOA office, Attn: PD Committee. The package must contain the following:
   1. Initial plan document – signed by the candidate and advisor (Model or custom plan)
   2. Letter of Commitment – signed by the candidate and advisor
   3. PD filing fee and payment form (form available in the back of this catalog)
      Note: A maximum of 15 units of activity may be undertaken prior to the date of initial plan acceptance confirmation from the SOA.

E. Once the candidate has received confirmation of initial plan acceptance from the SOA, the candidate will proceed with the execution of the proposed PD plan with continued guidance and review from the advisor. The plan must be completely executed within a 25-month period. The 25-month effective period for PD begins with the earlier of the following dates:
   1. date of the earliest professional program included in the PD plan, or
   2. date of advisor's sign-off on completion of the PD project component.

Process—Executed Plan

When advisor and candidate agree that all elements of the PD plan are completed, the candidate prepares the executed plan package for sign-off by the advisor and submission to the SOA for final approval. A written response to an executed plan submission will generally require six to eight weeks. Executed plan package must include the following:

A. Statement attesting to the plan's completion—signed by the advisor and candidate.
B. A brief report describing the overall educational benefits obtained and discussing any modifications to the original plan.
C. A program summary for each program/session that describes how that program helped to attain the educational objectives of the plan and what the candidate learned from the program that may benefit the candidate's current or future practice. The summary must be more than a list of the topics covered at the session.
   Note: Given the examination-validated format of the CIA's Practice Education Course and the AAA's Seminar on Life and Health Qualifications, candidates making use of these courses need not provide individual summaries for these programs.
D. Copy of the project report.
E. For non-approved programs, supporting documents obtained through program attendance (e.g., programs, handouts).

PD Document Submission—Additional Guidelines

A. All PD plan documents should be submitted to the PD Committee at the following address:

Professional Development Committee
Society of Actuaries
475 N. Martingale Road, Suite 800
Schaumburg, IL 60173

B. Please allow 6-8 weeks for a response to your executed plan submission.
C. Do not use company letterhead when submitting plan documents.
D. Avoid binding plan documents, as the materials will need to be copied for review by the PD Committee. (Staples, clips or rubber bands are acceptable.)
E. Include a cover memo stating the intent of the package (initial plan, executed plan, follow-up to previously submitted plan etc.)
F. Include your PD filing fee and payment form when submitting your initial plan

Note: *If it is necessary to submit your PD filing fee and payment form separate from your PD plan documents, please send the payment to the address specified on the payment form for check or credit card payments. If submitting payment form along with plan documents, please send to the SOA office address, not the P.O. Box listed on the payment form.*

Electronic Plan Submissions

PD plans may be submitted electronically to pdcomments@soa.org. When adhering to the following guidelines, electronic submission of the plan facilitates the review/approval process.

1. Initial Plan Package - Only the PD plan document need be submitted electronically. The *original* signed PD plan document along with hard copies of the letter of commitment and PD filing fee payment form must still be submitted to the PD Committee at the SOA office via mail or other courier at the same time as the electronic submission.
2. Executed Plan Package - The executed plan documents may be submitted electronically. The *original* signed documents along with any necessary handouts or supporting documents not in electronic form must be submitted to the PD Committee at the SOA office via mail or other courier at the same time as the electronic submission.

Electronic Document Guidelines

1. Word, EXCEL or PowerPoint documents only.
2. One document submissions only - If information is currently stored in more than one Word, EXCEL or PowerPoint file, it is necessary to combine those files into one document prior to submission.
3. Include cover letter information at the front of the document, not in the message portion of the email. Include the names of you and your advisor only once at the beginning of the document. Employer information should not be included in this document.

Plan Components – Minimum 50 units required

A. Formal Professional Program Component = 35 units minimum

1. SOA-approved Programs = 20 units minimum

All SOA-approved programs and meeting sessions are listed on the PD page of the SOA Web site. Program sponsors requesting formal program approval may submit information to the SOA office, Attn: PD Committee. A sixty-minute hour will generally be awarded 1 unit. Typically, an SOA-approved seminar will be given a maximum of 6 units per day, with a limit of 15 units for any one program, regardless of length. The following types of programs will in most cases be SOA-approved:

a. SOA, CAS, CIA, CCA, ASPA or AAA programs (and other recognized actuarial organizations)
   - seminars
   - symposia
   - appropriate meeting sessions

b. Evaluation-validated programs (with passing score) - Values for many examination-validated options are listed on the PD page of the SOA Web site.

- Conversion credit from pre-2000 SOA education system - Credits are first applied to the project component, then to the SOA-approved program requirement and finally to any remaining units needed. However, a candidate with 15 or more units of conversion credit may elect to complete a project if desired.
- Ph.D. dissertations or research papers published in refereed journals may also be eligible for credit if relevant.

c. Programs or examinations required for PD by JBEA, AAA or CIA

Note: In special circumstances, such as when the candidate is active in an emerging practice area, relevant programs outside these categories (e.g., graduate level courses) may receive SOA-approved status.

2. Non-approved Programs = 15 Units maximum

The non-approved category includes educational programs that the candidate and advisor believe are consistent with the educational objectives of the candidate's plan. Nonactuarial seminars, professional meetings and graduate level courses are among the programs suitable for inclusion. Non-approved programs are valued at a maximum of 5 units per full day program and 10 units maximum for any one program, regardless of length.

Program presenters may be awarded credit at a rate of 3 units for 1 hour of presentation. If the program is classified as SOA-approved, the presenter will receive SOA-approved units. If the program is not SOA-approved, the presenter will receive non-approved units for appropriate programs.

Candidates are permitted to make use of professionally audiotaped, videotaped, and/or Internet programs up to a maximum of 15 units per plan (either SOA-approved or non-approved). However, these programs are limited to those sponsored by the SOA or other recognized actuarial organizations (e.g., CAS, CIA, CCA, ASPA, AAA). In the case of audio or videotaped programs, the date of the actual program will serve as the eligibility date for a candidate's PD plan time frame.

All programs, regardless of approval status, must be consistent with the educational objectives of the candidate's PD plan for credit to be received.

B. Project Component = 15 units (60-100 hours expected for completion)

The candidate defines a project that addresses an issue of relevance to his/her chosen practice area and that relates to the candidate's stated educational objectives. The candidate discusses the project with his/her advisor and then undertakes the necessary research and investigation including most or all of the following steps:

1. Identification of the practical situation or issue requiring research and analysis.
2. Review of appropriate literature.
3. Collection of data.
4. Analysis of data and literature.
5. Development and articulation of conclusions and recommendations reached from the research and analysis.
6. Communication of the project's purpose, scope, results and conclusion to the advisor and other relevant parties.

The project represents a significant work effort. It may be associated with work done in conjunction with the candidate's employment but must include additional independent research and relate to the educational objectives of the candidate's PD plan.

The PD Committee anticipates that the project will require a commitment of 60-100 hours by the candidate. The candidate will communicate the essential aspects of the project in a medium, oral or written, that provides an opportunity for peer review and comment.

A written report on the project must be submitted to the SOA for review. Where the project contains information of a proprietary or sensitive nature, the candidate is not required to submit a full report; however, the candidate must provide a summary sufficient to allow assessment that the project has contributed satisfactorily to meeting the candidate's educational objectives. Candidates will not be required to submit a

full project outline with the initial plan submission. However, the PD Committee will need to be able to clearly identify the project steps in the candidate's written project report submitted with the executed plan.

Further information on the PD requirement (including all related documents) may be found on the PD page of the SOA Web site at www.soa.org/eande/prodev.html.

Associateship Professionalism Course (APC)

The Associateship Professionalism Course (APC) is a component of the requirements for the Associate (ASA) designation. Candidates must complete five of the six Basic Education courses (Courses 1–6) prior to becoming eligible to register for the course. If space is available, candidates who have completed a minimum of four courses will be invited to attend.

The Associateship Professionalism Course is one-half day in length. The course covers professionalism, ethics and legal liability and makes extensive use of the case study method.

The SOA Board of Governors has approved the Canadian Institute of Actuaries' Professionalism Course as a substitute for the APC for all candidates practicing in Canada. Therefore, Canadian candidates who attend the CIA course are not required to take the SOA course.

For course dates and registration information, please see our Web site at www.soa.org under Education/Examinations or contact Melissa Gullickson at mgullickson@soa.org or 847-706-3563.

Fellowship Admissions Course (FAC)

The final requirement to attain the FSA designation is the Fellowship Admissions Course. The FAC can be taken any time after all other educational requirements have been completed. Once these requirements are met, candidates may register for the next available session or any future session. Candidates will not receive the FSA designation, or be entitled to use such designation, until they have completed the FAC.

The FAC is designed to help actuaries deal effectively with the issues and situations they may confront as they progress in their organizations. It has three main educational purposes:

1. To increase awareness of professional ethical issues and identify strategies to address them, and
2. to encourage actuaries to approach problem solving from varied directions/perspectives, and
3. to review professionalism and malpractice avoidance.

In order to accomplish these objectives, the FAC has been designed to provide the actuary with opportunities to explore these issues over a 2½ day period primarily through the case study method.

Registration information will be sent to candidates after their final executed PD plan has been approved by the SOA PD committee. It is recommended that your PD Plan be submitted at least 6–8 weeks before the FAC registration deadline. Candidates who earn eligibility upon successful completion of an SOA examination, including Course 7 seminar, will be sent registration information after the pertinent passing scores are released. Registrations will be accepted up to 30 days prior to the start of a given FAC session, space permitting.

For upcoming dates please see our Web site at www.soa.org under Education/Examinations. Questions on the FAC may be directed to Melissa Gullickson at mgullickson@soa.org or 847-706-3563.

Enrolled Actuaries Examinations

The Enrolled Actuaries examinations are co-administered by the SOA, ASPA, and the Joint Board for the Enrollment of Actuaries.

The official description of the EA examinations is contained in the *Examination Program*, available from the Joint Board for the Enrollment of Actuaries. A copy of this announcement will be sent to each candidate who registers for the examination at the same time as the candidate's Ticket of Admission.

Candidates should note that the EA examination questions do not require the mastery of specified study materials or specified chapters of any particular textbooks. Moreover, a specified topic may not be fully covered in every suggested reference. Examination questions may even deal with practical situations not necessarily covered in any published material.

The study material below was listed in the *January 2001 Examination Program*. The Advisory Committee on Actuarial Examinations believes that most (if not all) of the topics in the syllabus are treated in one or more of these references. The *January 2001 Examination Program* has the official description of the Fall 2001 Enrollment examinations.

The SOA provides some study material for EA candidates. While the E&E Committee believes that these references are useful to EA candidates the materials were not necessarily written with the particular nature of the Joint Board examinations in mind. The SOA SNs are listed separately from the Joint Board's suggested readings.

Note: The course of reading for this course may include commutation functions that are not included in the Second Edition of *Actuarial Mathematics*. Candidates who want a summary of commutation functions and their use can order Study Note 600-99-99, Commutation Functions, from the SOA.

The following list of topics and suggested readings is from the Joint Board's *January 2001 Examination Program* Booklet.

EA-2, A Pension (EA-2, Segment A) Examination

The EA-2, Segment A examination is 4 hours in length and covers the selection of actuarial assumptions and the calculation of minimum required and maximum tax-deductible contributions under current pension law, along with the related actuarial mathematics. Segment A of the EA-2 examination presupposes knowledge of the topics covered in the EA-1 examination.

Syllabus

1. Actuarial cost methods, including unit credit, projected unit credit, entry age normal, individual level premium, aggregate, individual aggregate, attained age normal, frozen initial liability, shortfall, one-year term, and variations thereof.
2. Selection of actuarial assumptions.
3. Determination of experience gains and losses and analysis by source.
4. Effect on valuation results of various patterns of experience, including experience with respect to investment earnings changes in asset value, mortality, disability, employee turnover, changes in compensation, retirement, choice of retirement options, and Social Security.
5. Effect on valuation results of changes in plan provisions, actuarial cost methods, asset valuation methods, and actuarial assumptions.
6. Valuation of ancillary benefits.
7. Valuation techniques for handling employee contributions and split-funded arrangements.
8. Minimum funding requirements including, but not limited to:
   a. The basics of the funding standard account including amortization periods, where applicable, and the credit balance,
   b. Full funding limitation,
   c. Required quarterly contributions and liquidity shortfall,
   d. The additional funding charge and accumulated reconciliation account,
   e. Waivers of funding deficiencies, and the alternative minimum funding standard account,
   f. The effect of spinoffs and mergers on the funding standard account,
   g. Special funding requirements for multiemployer plans,

9. Maximum deductible contributions for federal income tax purposes including the treatment of contribution carryovers and contributions for a plan year which are deducted for the prior taxable year.
10. Penalty taxes for failures to meet minimum funding standards and for contributions in excess of tax deductible limits.
11. Valuation of plan assets.

Texts

- *Actuarial Cost Methods, A Review,* 1998, by Farrimond, W., Farber, D., Matray, G., and Mayer, D.
- *Pension Funding and Valuation,* (Second Edition), 1996, by Aitken, W.H.
- *Pension Mathematics for Actuaries*, (Second Edition), 1990, by Anderson, A.W.
- *The Fundamentals of Pension Mathematics,* 1989, by Berin, B.N.

Additional Readings

ASP No. 4, "Measuring Pension Obligations"
ASP No. 27, "Selection of Economic Assumptions for Measuring Pension Obligations"
ASP No. 35, "Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations"
Announcement 96-26, Announces Rules for Refund to Avoid Excise Tax on Non-deductible Contributions
Employee Retirement Income Security Act of 1974 (ERISA) §302, as amended through June 30, 2001
2000 Schedule B of Form 5500, Including Instructions
IRS Promulgations:

Internal Revenue Code Sections, as amended through June 30, 2001

404	Deductible Employer Contributions to a Deferred-Payment Plan
412	Minimum Funding Standards
413	Collectively Bargained Plans, etc.
414 Subsection (*1*) only	Definitions and Special Rules—Merger and Consolidations of Plans or Transfers of Plan Assets
4971	Taxes on Failure to Meet Minimum Funding Standards
4972	Tax on Nondeductible Contributions to Qualified Employer Plans
6059	Periodic Report of Actuary

Notice 87-37 Excise Tax on Non-Deductible Contributions
Notice 89-52, Quarterly Contributions
Notice 90-11, Interest Rates for Calculating Current Liability
Regulation 1.404(a)-14, Special Rules in Connection with ERISA—Deductible Limits
Regulation 11.412(c)-12, Extension of Time to Make Contributions
Regulation 1.412(c)(1)-1, Determinations to be Made Under Funding Method
Regulation 1.412(c)(1)-2, Shortfall Method
Regulation 1.412(c)(2)-1, Valuation of Plan Assets; Reasonable Actuarial Methods
Regulation 1.412(c)(3)-1, Reasonable Funding Methods
Regulation 301.6059-1, Periodic Report of Actuary
Revenue Procedure 90-49, Recovery of Excess Contributions
Revenue Procedure 2000-40, Automatic Approval for Change of Funding Method
Revenue Procedure 2000-41, Change in Funding Method
Revenue Ruling 77-2, Change in Benefit Structure After Valuation Date
Revenue Ruling 78-48, Assumptions & Methods Specified in Plan
Revenue Ruling 78-331, Assumption that Employees Retire at Normal Retirement Date
Revenue Ruling 79-237, Terminating Plan—Funding Standard Account and Penalty Taxes
Revenue Ruling 80-315, Supplementary Benefits
Revenue Ruling 81-13, Full Funding Limitation
Revenue Ruling 81-136, Election to Receive Benefits Less than Plan Provides
Revenue Ruling 81-137, Separate Funding Account for Separate Plans
Revenue Ruling 81-212, Funding Standard Account, with spinoff (see Revenue Ruling 86-47)
Revenue Ruling 81-213, Experience Gains and Losses, Amortizations
Revenue Ruling 81-214, Interest Charges in Funding Standard Account
Revenue Ruling 82-125, Full Funding Limitation and Deductible Limit
Revenue Ruling 84-62, Deductible Limit Under 404(a)(1)(A)
Revenue Ruling 86-47, (Sequel to 81-212)

Revenue Ruling 95-28, (Unisex) Mortality Table, Additional Funding Charge
Revenue Ruling 95-31, Quarterly Contributions and Liquidity
Revenue Ruling 96-7, Disability Table, Additional Funding Charge
Revenue Ruling 96-20, Amortization Bases in Determining Additional Funding Charge
Revenue Ruling 96-21, Transition Rule Under 412(l)(11)
Revenue Ruling 2000-20, Minimum Funding Standards—Funding Standard Account—Amortization Bases

Study Notes (selected by the SOA)

Code	Title
E2A-21-00	Pension Funding Exercises
E2A-22-00	Addendum to E2A-21-00
E2A-25-90	Multiemployer Pension Plans Amendment Act of 1980
E2A-27-96	Mortality Tables for Pension Plans
E2A-28-96	Variations on Entry Age Normal Cost Methods
E2A-36-97	IRC Section 413
E2A-42-90	Alternate Minimum Funding Standard
E2A-45-95	IRC Section 412 (Second Printing)
E2A-46-92	Contributory Pension Plans after OBRA ‘89
E2A-47-95	IRC Section 404
E2A-49-00	Penalty Taxes Under the US IRC
E2A-52-97	Excerpt on Plan Qualification
E2A-60-01	Selection of Interest Assumptions for Pension Plan Valuation
E2A-61-01	Selection of Actuarial Assumptions

Commutation Functions Study Note (600-99-99) can be purchased separately on the study note order form.

In addition, it is suggested that candidates contact ASPA for their recommended readings and any study materials they may be offering.

DESCRIPTION OF 2001 COURSES

Basic (Courses 1–6)

Course 1 Mathematical Foundations of Actuarial Science

This course develops the candidate's knowledge of the fundamental mathematical tools for quantitatively assessing risk. The application of these tools to problems encountered in actuarial science is emphasized. A thorough command of calculus and probability topics is assumed. Additionally, a very basic knowledge of insurance and risk management is assumed.

Course 2 Interest Theory, Economics and Finance

This course develops the candidate's knowledge of interest theory, intermediate microeconomics and macroeconomics and the fundamentals of finance. It assumes a basic knowledge of calculus and probability.

Course 3 Actuarial Models

This course develops the candidate's knowledge of the theoretical basis of actuarial models and the application of those models to insurance and other financial risks. A thorough knowledge of calculus, probability and interest theory is assumed. A knowledge of risk management at the level of Course 1 is also assumed.

The candidate will be required to understand, in an actuarial context, what is meant by the word "model," how and why models are used, their advantages and their limitations. 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.

Course 4 Actuarial Modeling

This course develops the candidate's skills in modeling and covers important actuarial and statistical methods that are useful in modeling. A thorough knowledge of calculus, linear algebra, probability and mathematical statistics is assumed.

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 covered in Course 3.

Courses 1–4 are jointly administered by the SOA and the CAS.

Course 5 Application of Basic Actuarial Principles (Offered in Fall Only)

This course develops the candidate's knowledge of basic actuarial principles applicable to a variety of financial security systems: life, health, property & casualty insurance, annuities, and retirement systems. The candidate will be required to understand the purpose of these systems, the design and development of financial security products, the concepts of anti-selection and risk classification factors, and the effects of regulation and taxation on these issues. The course will develop the candidate's knowledge of principles and practices applicable to the determination of premiums and rates and the valuation and funding of these financial security systems.

Course 6 Finance and Investments (Offered in Spring Only)

This course extends the candidate's knowledge of basic actuarial principles in the fields of investments and asset management. Candidates completing this course will have developed some expertise in the areas of capital markets, investment vehicles, derivatives-applications, principles of portfolio management and asset-liability management.

Advanced (Courses 7 and 8)

Course 7 Applied Modeling

This course introduces the candidate to the practical considerations of modeling through an intensive seminar using a case study format. Candidates are required to pass a pre-test and have credit for Courses 1–6. The interactive approach of the seminar will require candidates to draw upon knowledge from the basic courses and learn applied modeling skills in a hands-on environment. The course also emphasizes communication skills, teamwork and the synthesis of subjects in an applied setting.

All seminars will consist of a common core segment during which the instructor will involve the attendees in several case studies and work with candidates to address various aspects of the modeling process. An Extended Case Study segment features presentation and discussion of a single general or practice-area-specific case study, covering all of the major components of the modeling process. This segment varies from seminar to seminar. The content of this segment of a practice-area-specific seminar will focus on application(s) in a single practice area. The content of this portion of a general seminar will be designed so that no particular practice area background is significantly advantaged or disadvantaged. During the fourth day of the seminar, candidates individually complete the project assignment, (general or practice-area specific) which is the means of evaluation of the candidates' comprehension of the seminar content.

Course 8 Advanced Specialized Actuarial Practice (Offered in Fall Only)
Finance

This course trains candidates in the financial aspects of operating and evaluating a business, with particular emphasis on the business of financial intermediaries. This includes gaining an understanding of several subjects, including accounting, corporate finance, investment banking, strategic planning, financial risk management, financial statement analysis, and the operations of financial areas.

Course 8 Advanced Specialized Actuarial Practice (Offered in Fall Only)
Health, Group Life, and Managed Care

This course consists of a core component and two extensions. The material for the core component will be common to every candidate sitting for this examination. However, each candidate will select only one of the two extensions for individual study.

Both the core component and the two extensions address actuarial principles within the context of plan design, data analysis and rating, and financial management. The core component also addresses issues related to administrative and delivery systems. The common elements of these general principles will be addressed in the core component of the examination as they relate to group life, both individual and group coverages of disability income, dental, medical and long-term care insurance, and the financing and delivery of medical and dental services provided in a managed care environment.

The course extension on Health and Group Life ("Group Extension") provides a more in-depth treatment of the application of these actuarial principles to group life and both individual and group disability income, dental, medical and long-term care insurance products.

The course extension on Managed Care ("Managed Care Extension") provides a more in-depth treatment of the application of actuarial principles to both the medical and dental managed care product environments. This course extension focuses primarily on the managed care delivery systems as currently implemented in the United States.

Course 8 Advanced Specialized Actuarial Practice (Offered in Fall Only)
Individual Insurance

This course covers advanced topics on individual life, annuity, and reinsurance coverages. The topics address the following areas relating to individual life and annuity products: 1) marketing; 2) actuarial principles and practices used in pricing; 3) valuation and financial statements; and 4) product development and pricing.

Course 8 Advanced Specialized Actuarial Practice (Offered in Fall Only)
Investments

This course pursues advanced topics in investment and asset management with a concentration on the application of asset-liability management techniques. Candidates completing this course will have enhanced their expertise in the areas of portfolio management theory and application, option pricing theory, and asset-liability management.

Course 8 Advanced Specialized Actuarial Practice (Offered in Fall Only)
Retirement Benefits

This course exposes candidates to all types of retirement plans from both the perspective of a consulting actuary and that of an actuary working in a financial organization offering retirement products and services. Topics covered include design of retirement programs, valuation considerations, the regulatory environment, pension funding vehicles, financial reporting of retirement programs, and professional standards.

The course will be administered in two segments: 1) Pension Funding Mathematics; and 2) Comprehensive Segment. Each of these segments are independent and may be taken in different years. However, the Comprehensive Segment will presume knowledge of the topics covered in the Pension Funding Mathematics Segment. Candidates with credit for the Enrolled Actuaries' examination EA-2, Segment A (EA-1, Segment B before 1/1/01), will automatically receive credit for the Course 8 Retirement Benefits Pension Funding Mathematics Segment and may not receive credit for both.

Enrolled Actuaries Examinations

EA-1 **Offered in Spring Only**

The EA-1 examination covers (1) the mathematics of compound interest and practical financial analysis, and (2) the mathematics of life contingencies and practical demographic analysis. It is a 2½ hour multiple-choice examination.

EA-2, Segment A **Offered in Fall Only**

Segment A of the EA-2 examination covers the selection of actuarial assumptions and the calculation of minimum required and maximum tax-deductible contributions under current pension law, along with the related actuarial mathematics. Segment A of the EA-2 examination presupposes knowledge of the topics covered in the EA-1 examination. The examination is a four hour multiple-choice examination.

EA-2, Segment B **Offered in Spring Only**

Segment B of the EA-2 examination covers relevant pension laws, in particular the provisions of the Employee Retirement Income Security Act and related laws, regulations, and rulings as they affect pension actuarial practice. Segment B presupposes knowledge of the topics covered in Segment A and in the EA-1 examination. The examination is a 2½ hour multiple-choice examination.

CONVERSION RULES

Course 1 **Mathematical Foundations of Actuarial Science**. Credit given if candidate has passed either Course 100 (Calculus and Linear Algebra) or Course 110 (Probability and Statistics). If candidate has passed both 100 and 110, candidate receives credit for Course 1 and 20 unassigned credits.

Course 2 **Interest Theory, Economics and Finance**. Credit given if candidate has 20 unassigned credits and has passed Course 140 (Mathematics of Compound Interest) or 141 (EA-1, Segment A).

Course 3 **Actuarial Models**. Credit given if candidate has passed both Course 150 (Actuarial Mathematics) and Course 151 (Risk Theory). Credit will also be given if a candidate has passed Course 150 plus 30 unassigned credits.

Course 4 **Actuarial Modeling**. Credit will be given if candidate has passed Course 120 (Applied Statistical Methods), Course 160 (Survival Models and Construction of Tables), and CAS 4B (Credibility Theory and Loss Distributions). Alternatively, credit will also be given if a candidate has passed two out of the three courses (120, 160, CAS 4B) as well as 20 unassigned credits. If a candidate does not have sufficient credit to obtain Course 4 credit, the candidate will be awarded 15 unassigned credits for each of the specified courses passed.

Course 5 **Application of Basic Actuarial Principles**. Credit given if candidate has credit for both Courses 200 (Introduction to Financial Security Programs) and 210 (Introduction to Actuarial Practice).

Course 6 **Finance and Investments**. Credit given if a candidate has credit for both Courses 220 (Introduction to Asset Management and Corporate Finance) and 230 (Principles of Asset/Liability Management). Alternatively, credit will be given if a candidate has credit for Course 220 and 25 unassigned credits.

Candidates who have credit for Courses 1–6 at the time of the conversion will attain the ASA designation.

Course 7 Applied Modeling. Credit will be given for 50 unassigned credits.

Course 8 Advanced Actuarial Practice. Credit will be given if a candidate has 50 credits from required courses within a single track plus 10 unassigned credits.

Professional Development

The PD requirement will be satisfied if the candidate has 50 unassigned credits. Candidates with 15 or more PD units from the conversion of examination credit are exempted from the project requirement. Any such candidates who are interested in doing a project are encouraged to do so—they will, of course, earn 15 PD credits for successfully completing a project.

Candidates who have credit for the Research Paper option are not required to complete a separate project as well. They are required to complete 50 PD units with 25 or more units coming from SOA-approved options.

*Candidates who passed CAS Part 4A prior to Fall 1997 may substitute CAS Part 4A for Course 140 or 141 to obtain credit for Course 2.

Additional Information

1. Please note that conversion credit for a course is used exactly once.
2. Candidates wishing to attain credit via conversion with the SOA for Courses 3 and 4 in the Education 2000 system must attain credit for them via the SOA conversion rules.
3. Unassigned credits will be awarded for any course from the pre-2000 system not being used for direct conversion credit for a course under the new system. Courses retain the original credit value earned when passed, unless otherwise specified. ±
4. Unassigned credits can be used, as described in these conversion rules, to help gain credit for specific Courses 1–8 or for credit toward the PD requirement, according to the following conditions:
   a. Unassigned credits must be used to meet the requirements for Courses 1–8 in ascending order (except as noted in 4.c. below).
   b. Unassigned credits not used for Courses 1–8 will be credited toward the PD requirement and will not expire. Fifty (50) unassigned credits will complete the PD requirement.
   c. Credits from required courses within a pre-2000 specialty track will be retained for use toward Course 8 (unless the candidate does not have sufficient track credits or unassigned credits to satisfy the Course 8 requirement). Unassigned credits will be used toward Course 8 before being applied to Course 7. (This means that a candidate who has 50 credits from track-required courses plus at least 10 unassigned credits will receive credit for Course 8. This candidate would receive credit for Course 7 only if the candidate has another 50 unassigned credits.)
5. Courses used to attain ASA are not applied individually for conversion credit, except under special circumstances where a course is required to satisfy a requirement for Fellowship. Candidates in this situation will be advised of their alternatives.
   a. ASA attained under educational regulations in effect from August 1, 1995 to December 31, 1999 earns conversion credit for Courses 1–6 plus 25 unassigned credits.
   b. ASA attained under educational requirements in effect prior to July 31, 1995 earns conversion credit for Courses 1–4 plus 25 unassigned credits.

Questions about the application of the conversion rules may be directed to the E&E Ombudsperson, at the SOA office (telephone 847-706-3527, fax 847-706-3599, or e-mail ombudsperson@soa.org.) [Note that the EA-1, B refers to the pre-2001 EA examination system.]

± As EA-1, B is a separate required component for the Course 8 Retirement Benefits examination for some candidates, credit for EA-1, B will not automatically become unassigned credit at the time of the conversion. Candidates wishing to use EA-1, B as unassigned credit will be required to confirm, in writing, that they will be completing a Course 8 specialty other than Retirement Benefits.

TEXTBOOKS INCLUDED IN THE COURSE OF READING—FALL 2001

Candidates should order texts as early as possible to avoid being affected by possible delays. Any candidate who experiences a significant delay in obtaining a book from the publisher should contact the SOA office immediately.

For texts available from the SOA, see the order form in the back of this Catalog.

Course(s)	Author(s)	Title
1	Anton, H.	*Calculus: A New Horizon* (Sixth Edition), 1999, John Wiley and Sons.
1	Edwards, C.H., Penney, D.E.	*Calculus with Analytic Geometry* (Fifth Edition), 1997, Prentice-Hall.
1	Ghahramani, S.	*Fundamentals of Probability* (Second Edition), 1999, Prentice-Hall.
1	Gleason, A.M., Hughes-Hallett, D. McCallum, W.G.	*Calculus: Single and Multivariable* (Second Edition), 1998, John Wiley and Sons.
1	Hassett, M., Stewart, D.	*Probability for Risk Management*, 1999, ACTEX Publications.
1	Hogg, R.V., Tanis, E.A.	*Probability and Statistical Inference* (Sixth Edition), 2001, Prentice-Hall.
1	Ross, S.M.	*A First Course in Probability* (Fifth Edition), 1998, Prentice-Hall.
1	Thomas, G.B., Finney, R.L.	*Calculus and Analytic Geometry* (Tenth Edition), 2001, Addison-Wesley.
2	Brealey, R.A., Myers, S.C.	*Principles of Corporate Finance* (Sixth Edition), 2000, Irwin/McGraw-Hill.
2	Kellison, S.G.	*The Theory of Interest* (Second Edition), 1991, Irwin/McGraw-Hill.
2	Landsburg, S.E.	*Price Theory and Application* (Fourth Edition), 1999, West Publishing.
3	Bowers, N.L., Gerber, H.U., Jones, D.A., Hickman, J.C., Nesbitt, C.J.	*Actuarial Mathematics* (Second Edition), 1997, SOA.
3	Ross, S.M.	*Introduction to Probability Models* (Seventh Edition), 2000, Harcourt/Academic Press.
3, 4	Jones, B.L.	*Actuarial Models and Modeling: An Interactive Approach,* 2000, ACTEX Publications, (CD-ROM).
4	Klein, J.P., Moeschberger, M.L.	*Survival Analysis,* 1997, Springer-Verlag.
3, 4	Klugman, S.A., Panjer, H.H., Willmot, G.E.	*Loss Models: From Data to Decisions,* 1998, John Wiley and Sons.
3, 4	Ross, S.M.	*Simulation* (Second Edition), 1997, Harcourt/Academic Press.
†4	Casualty Actuarial Society	*Foundations of Casualty Actuarial Science (*Fourth Edition), 2001, CAS. Available as Study Note 4-21-01.

4	Pindyck, R.S., Rubinfeld, D.L.	*Econometric Models and Economic Forecasts (*Fourth Edition), 1998, Irwin/McGraw-Hill.
5	Aitken, W.H.	*A Problem Solving Approach to Pension Funding and Valuation* (Second Edition), 1996, ACTEX Publications.
5, 8I	Atkinson, D. Dallas, J.	*Life Insurance Products and Finance*, 2000, SOA.
5, 8G, 8M	Bluhm, W.F., Editor	*Group Insurance*, (Third Edition), 2000, ACTEX Publications.
†5	Brown, R.L.	*Introduction to Ratemaking and Loss Reserving for Property and Casualty Insurance* (Second Edition), 2001, ACTEX Publications.
5, 8R	McGill, D.M., Brown, K.N., Haley, J.J., Schieber, S.J.	*Fundamentals of Private Pensions* (Seventh Edition), 1996, University of PA Press.
†5, 8G, 8M	O'Grady, F.T.	*Individual Health Insurance,* 1988, SOA.
†8F, 8V	Chew, D., Jr.	*The New Corporate Finance: Where Theory Meets Practice* (Third Edition), 2001, Irwin/McGraw-Hill.
8F	LOMA	*Measuring Financial Performance in the Life Insurance Industry,* 1992, LOMA.
8F	Megginson, W.L.	*Corporate Finance Theory,* 1997, Addison Wesley.
†8F	Scholes, M., Wolfson, N.	*Taxes and Business Strategy: A Planning Approach* (Second Edition), 2001, Prentice-Hall.
8F	Tiller, J.E., Jr. Tiller, D.F.	*Life Health & Annuity Reinsurance* (Second Edition), 1995, ACTEX Publications.
†8F, 8V	Vanderhoof, I.T., Altman, E.I.	*The Fair Value of Insurance Business,* 2000, Kluwer Academic.
8G, 8M, 5	Bluhm, W.F., Editor	*Group Insurance*, (Third Edition), 2000, ACTEX Publications.
8G, 8M	McKay, R.J., Editor	*Canadian Handbook of Flexible Benefits,* (Second Edition), 1996, John Wiley & Sons.
8G, 8M, 5	O'Grady, F.T.	*Individual Health Insurance,* 1988, SOA.
†8G, 8M	Kongstvedt, P.R.	*The Managed Health Care Handbook* (Fourth Edition), 2001, Aspen Publishing.
8G, 8M	Sutton, H.L., Sorbo, A.J.	*Actuarial Issues in the Fee-for–Service Prepaid Medical Group* (Second Edition), 1993, Medical Group Management.
8I, 5	Atkinson, D. Dallas, J.	*Life Insurance Products and Finance*, 2000, SOA.
8I	Kotler, P.	*Marketing Management* (Tenth Edition), 2000, Prentice-Hall.
8I	Laporte, P., Editor	*Marketing for Actuaries,* 2000, LIMRA.
8P, EA-2, A	Anderson, A.W.	*Pension Mathematics for Actuaries* (Second Edition), 1990, ACTEX Publications.

† Indicates a new textbook or a new edition.

8R	Allen, E.T., Melone, J.J., Rosenbloom, J.S., Vanderhei, J.L.	*Pension Planning* (Eighth Edition), 1997 Irwin/McGraw-Hill.
8R	Bader, L.N., Kogelman, S., Leibowtiz, M.L.	*Return Targets & Shortfall Risks,* 1996, Irwin/McGraw-Hill.
8R	Hall, G.M.	*Mercer Handbook Canadian Pension & Benefit Plans* (Eleventh Edition), 1996, CCH Canada.
8R, 5	McGill, D.M., Brown, K.N., Haley, J.J., Schieber, S.J.	*Fundamentals of Private Pensions*, (Seventh Edition), 1996, University of PA Press.
8R	Maginn, J.L., Tuttle D.L.	*Managing Investment Portfolios* (Second Edition), 1990, Warren Gorham Lamont.
†8R	Mitchell, O.S. Hustead, E.C.	*Pensions in the Public Sector,* 2000, University of PA Press.
8R	Turner, J., Watanabe, N.	*Private Pension Policies in Industrialized Countries—A Comparative Analysis,* 1995, W.E. Upjohn Institute for Employment Research.
†8V	Babbel, D. Fabozzi, F.J.	*Investment Management for Insurers*, 1999, Frank J. Fabozzi & Assoc.
†8V, 8F	Chew, D., Jr.	*The New Corporate Finance: Where Theory Meets Practice* (Third Edition), 2001, Irwin/McGraw-Hill.
8V	Dattatreya, R. Hotta, K.	*Advanced Interest Rates and Currency Swaps: State of the Art Products, Strategies and Risk Management Applications,* 1994, Irwin-McGraw-Hill.
8V	Fabozzi, F.J.	*Handbook of Mortgage Backed Securities*, (Fourth Edition), 1995, Irwin/McGraw-Hill.
8V	Hull, J.C.	*Option, Futures, & Other Derivatives*, (Fourth Edition), 2000, Prentice-Hall.
8V	Panjer, H.H., Editor	*Financial Economics*, 1998, SOA.
EA-2, A	Aitken, W.H.	*Pension Funding and Valuation*, (Second Edition), 1996, ACTEX Publications.
EA-2, A, 8P	Anderson, A.W.	*Pension Mathematics for Actuaries,* (Second Edition), 1990, ACTEX Publications.
EA-2, A	Berin, B.N.	*The Fundamentals of Pension Mathematics,* 1989, SOA.
EA-2, A	Farber, D., Farrimond, W., Matray, D., Mayer, G.	*Actuarial Cost Methods, A Review*, 1999, ASPA.

† Indicates a new textbook or a new edition.

PUBLISHERS AND ORDERING INFORMATION

The book distributors listed below carry textbooks for the SOA courses. Order forms from these distributors are included with each SN order, or they may be obtained from the Education Services Representative at 847-706-3515.

Order forms contain information such as prices, shipping charges, mailing policy and credit card acceptance. **Candidates should notify the Publication Orders Department at the SOA in writing if they encounter serious problems with any distributor.**

Distributors—Canada and US

ACTEX/Mad River Books
P.O. Box 974
Winsted, CT 06098
Phone: 800-282-2839
Fax: 860-738-3152
E-Mail: retail@actexmadriver.com
www.actexmadriver.com

The Actuarial Bookstore
P.O. Box 69
Greenland, NH 03840
Phone: 800-582-9672
Phone: 603-430-1252
Fax: 603-430-1258
E-Mail: sales@actuarialbookstore.com
www.actuarialbookstore.com

Actuarial Study Materials
(now distributed through ACTEX/Mad River Books)
www.actexmadriver.com

Evans Bookstore
11 Irwin Avenue
Toronto, ON M4Y 1L1
Canada
Phone: 416-964-0161
Fax: 416-964-7305

Rapidact
225 Eby Crescent
New Hamburg, ON N0B 2G0
Canada
Phone: 519-662-4512
Fax: 519-662-4766
E-Mail: books@rapidact.com
www.rapidact.com

SlideRule Books
P.O. Box 6
Mobridge, SD 57601-0006
Phone: 877-40-SLIDE
Fax: 877-41-SLIDE
www.SlideRulebooks.com

Publishers—US

ACTEX Publications
P.O. Box 974
Winsted, CT 06098
Phone: 800-282-2839
Fax: 860-738-3152
E-Mail: retail@actexmadriver.com
www.actexmadriver.com

Actuarial Standards Board
c/o American Academy of Actuaries
1100 17th Street NW, 7th Floor
Washington, DC 20006
Phone: 202-223-8196
Fax: 202-872-1948

Addison-Wesley/Pearson Education
200 Old Tappan
Old Tappan, NJ 07675
Phone: 800-922-0579
Fax: 800-445-6991

ASPA
Book Order Department
Department 417
PO Box 417
Waldford, MD 20604
Phone: 301-645-0756

Aspen Publishers
7201 McKinney Circle
PO Box 990
Frederick, MD 21701
Phone: 800-638-8437
Fax: 301-695-7931

Frank J. Fabozzi & Associates
858 Tower View Circle
New Hope, PA 18938-9400
Phone: 215-598-8924
Fax: 215-598-8932

Harcourt/Academic Press
6277 Sea Harbor Drive
Orlando, FL 32887
Phone: 800-245-8744
www.harcourt-ap.com

Insurance Accounting & Systems Association
PO Box 51008
Durham, NC 27717
Phone: 800-817-4275
Fax: 800-668-4272

Irwin/McGraw-Hill
Special Sales Department
6350 Crested Butte Circle
Colorado Springs, CO 80919
Phone: 800-338-3987
Fax: 718-533-1127

Kluwer Academic Publishers
101 Philip Drive
Assinippi Park
Norwell, MA 02061
Phone: 781-871-6600
Fax: 781-681-9045
E-Mail: kluwer@wkap.com

LOMA
2300 Windy Ridge Parkway
Suite 600
Atlanta, GA 30339
Phone: 770-951-1770
Fax: 770-984-0441

Medical Group Management Association
104 Inverness Terrace East
Englewood, CO 80112-5306
Phone: 303-799-1111
Fax 303-643-4439

Prentice-Hall/Pearson Education
200 Old Tappan
Old Tappan, NJ 07675
Phone: 800-922-0579
Fax: 800-445-6991

Society of Actuaries
475 N. Martingale Road
Suite 800
Schaumburg, IL 60173-2226
Phone: 847-706-3526
Fax: 847-706-3599
-Use order form in back of catalog

Springer-Verlag
175 Fifth Ave
New York, NY 10010
Phone: 800-777-4643
Fax: 212-533-3503

University of PA Press
PO Box 4836
Hampden Station
Baltimore, MD 21211
Phone: 800-445-9880
Fax: 410-516-6998

Warren Gorham Lamont
31 St James Avenue
Boston, MA 02116-4112
Phone: 800-950-1214
Fax: 617-292-8434

WE Upjohn
300 S Westnedge Avenue
Kalamazoo, MI 49007

West Publishing/Thompson
7625 Empire Drive
Florence, KY 41042
Phone: 800-347-7707

John Wiley & Sons, Inc.
1 Wiley Drive
Somerset, NJ 08875
Phone: 800-225-5945, x2497
Fax: 908-302-2300

Publishers—Canada

Addison-Wesley Longman
26 Prince Andrew Place
P.O. Box 580
Don Mills, ON M3C 2T8
Phone 800-387-8028
Or 416-447-5101
Fax: 800-465-0536
Or 416-443-0948

CCH Canadian
Order Desk
90 Sheppard Avenue East
Suite 300
North York, ON M2N 3A1
Phone: 800-224-2243 (International)
Phone: 800-268-4522 (Canada)
Fax: 800-461-4131 (Canada)

McGraw-Hill Ryerson, Ltd.
300 Water Street
Whitby, ON L1N 9B6
Phone: 905-430-5000
Or 800-565-5758 (Canada only)
Fax: 905-430-5203
Or 800-463-5885 (Canada only)

Prentice-Hall Canada
539 Collier Macmillian Drive
Cambridge, ON N1R 5W9
Phone: 800-567-3800
Fax: 800-263-7733

John Wiley & Sons, Canada, Ltd.
22 Worcester Road
Etobicoke, ON M9W 1l1
Phone: 416-236-4433
Or 800-567-4797 (Canada only)
Fax: 416-236-8743

ORDER FORMS/APPLICATIONS

All applications/order forms can be found on the Fall 2001 Basic Education Catalog web page.

Study Note and Published Reference Order Form

SOA Textbook Order Form

Application for Preliminary Actuarial Examinations (Courses 1–4)

Application for Actuarial Examinations (Courses 5, 8 and EA-2, A)

College/University Codes/Examination Centers and Center Numbers

Application for Course 7 Pre-Test

Application for Course 7 Seminar

Professional Development Filing Fee Payment Form

Professional Development Letter of Commitment

Request for Seminar/Review Class Information

ACTUARIAL ORGANIZATIONS

American Academy of Actuaries
(All Examinations)
1100 17th Street, N.W., 7th Floor
Washington, DC 20036
Phone: 202-223-8196
Fax: 202-872-1948
www.actuary.org

American Society of Pension Actuaries
(Pension Enrollment Examinations, joint administrator)
4245 N. Fairfax Drive, Suite 750
Arlington, VA 22203-1619
Phone: 703-516-9300
Fax: 703-516-9308
www.aspa.org

Canadian Institute of Actuaries
(All Examinations)
360 Albert Street, Suite 820
Ottawa, ON K1R 7X7 Canada
Phone: 613-236-8196
Fax: 613-233-4552
www.actuaries.ca

Casualty Actuarial Society
(Courses 1–4, joint administrator)
1100 North Glebe Road, Suite 600
Arlington, VA 22201
Phone: 703-276-3100
Fax: 703-276-3108
www.casact.org

Conference of Consulting Actuaries
(All Examinations)
1110 West Lake Cook Road, Suite 235
Buffalo Grove, IL 60089
Phone: 847-419-9090
Fax: 847-419-9091
www.ccactuaries.org

Joint Board for the Enrollment of Actuaries
(Pension Enrollment Examinations, joint administrator)
Internal Revenue Service (C:AP:DOP)
c/o Department of the Treasury
1111 Constitution Avenue, NW
Washington, DC 20220
Phone: 202-694-1854
Fax: 202-694-1876

Society of Actuaries
(All Examinations)
475 North Martingale Road, Suite 800
Schaumburg, IL 60173
Phone: 847-706-3500
Fax: 847-706-3599
www.soa.org