Society of Actuaries

Spring 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 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 professional 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. 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. Candidates who have credit for Courses 1–6 effective with the conversion to the Education 2000 system are not required to take the Associateship Professionalism Course.

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 exams). 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 subspeciality of either Health and Group Life or Managed Care.

GENERAL INFORMATION REGARDING EDUCATION AND EXAMINATIONS

Spring 2001 Examination Dates and Times

Course	Duration	Date	Time
Course 1	3 hours	Wednesday, May 23	8:30 AM–11:30 AM
Course 2	4 hours	Thursday, May 24	8:30 AM–12:30 PM
Course 3	4 hours	Thursday, May 17	8:30 AM–12:30 PM
Course 4	4 hours	Wednesday, May 16	8:30 AM–12:30 PM
Course 6	5 hours	Friday, May 11	8:30 AM–11:30 AM and 1:00 PM–3:00 PM
EA-1	2½ hours	Tuesday, May 15	8:30 AM–11:00 AM
EA-2, Segment B	2½ hours	Tuesday, May 15	1:00 PM–3:30 PM

Tentative Fall 2001 Examination Dates and Times

Course	Duration	Date	Time
Course 1	3 hours	Thursday, November 8	8:30 AM–11:30 AM
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

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. Please check the Web site for updated information as it becomes available.

Please check the SOA Web site for 2001 Course 7 seminar locations and dates as they become available.

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 $100 (U.S.). In the event that advance study material for the seminar has already been distributed, an additional $150 (U.S.) will be deducted from the amount to be refunded. A written request to change Course 7 registration to an alternate date or location will be accommodated when possible. However, in the event that advance study material already has been distributed for the original seminar, a fee of $150 (U.S.) will be assessed if the advance study material is different for the two seminars.

The SOA has the right to cancel or reschedule any of the Course 7 seminars if conditions warrant. In the event of a cancellation, 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.

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

Applications must be received on or before <u>April 1</u> for the May session, and on or before <u>October 1</u> 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 <u>$50</u> (U.S.) change-of-center fee. *No change of center may be made after April 1 for the May examinations, or after October 1 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 <u>not</u> valid. **All applications must include an original signature.**

Course Fees

     Fees listed in this Catalog are guaranteed through the May 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 Spring 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 6	$ 625.00
Course 7 Pre-test	$ 125.00
Course 7 Seminar	$ 900.00
EA-1	$ 125.00
EA-2, B	$ 125.00
Professional Development (Filing Fee)	$ 150.00

*All amounts in U.S. dollars.

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

     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 <u>written request</u> 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 June 30, 2001 for the May 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 **April 1 registration deadline** for the May 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 April 1** for the May 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.

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 exam 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 exam room. During the exam, 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 exam disqualified.

Calculators are no longer available for purchase through the SOA. Candidates can purchase calculators from some of the book distributors listed on page 55 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 exam 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 <u>write</u> 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.

FSA's Writing Examinations

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

As is the case for all candidates, FSA's 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.).

FSA's 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. FSA's 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.

Joint Sponsorship

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 . The Casualty Actuarial Society (CAS) jointly sponsors and administers Courses 1–4 with the SOA through Preliminary Actuarial Examinations. 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 Education Department of the SOA office.

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 Education Department at the SOA office 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 10.

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 <u>no</u> guessing adjustment, there is <u>never</u> 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 an 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 next combined with multiple-choice scores, if any, and candidates are ranked in score order. 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 allowed 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.

After the examination has been graded, the candidates are listed in score order. The next step is to determine where to draw the line between passing and failing scores. If grading were done on a "curve," this step would be easy. But rather than being in competition with the other candidates, each candidate is evaluated against a standard of adequate knowledge of the Course of Reading. A candidate who demonstrates adequate knowledge should pass regardless of how the total candidate group performed.

To maintain consistency in passing standards, the E&E Committee reviews extensive data to ascertain the level of difficulty of each examination relative to prior examinations and the level of preparedness of the current candidates relative to candidates who took the examination for the same course in other years.

After these determinations have been made by analyzing all relevant available data, the pass mark is set to achieve the desired consistency with prior standards. 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.

Case studies may be included with the SNs for certain courses. Candidates should become familiar with the case study before reading the other study materials. The case study can help to provide a context for the readings. Examination questions may be based on the case study, and in that event, should be answered from the perspective of the case study and not in generalities.

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 Education 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. 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. 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 may be used as the basis for questions on an examination. In that situation, 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 ccimo@soa.org.

COURSE OF READING AND DESCRIPTION OF SPRING 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 exam 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

The examination for this course consists of three hours of multiple-choice questions.

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. Note: The electronic copy of this catalog contains a direct link to available SNs.

Code	Title
1-05-01	Course 1 Introductory Study Note
1-09-00	Sample Examination #1
1-10-00	May 2000 Course/Exam 1
1-12-00	November 2000 Course/Exam 1
1-21-00	Risk and Insurance

1-22-00 Chapters 4, 10 and 12 from *Risk Management and Insurance* by C.A. Williams, Jr., and M.L. Smith, 1998, McGraw-Hill, (background reading) **(not available electronically)**

Course 2   Interest Theory, Economics and Finance

The examination for this course consists of four hours of multiple-choice questions.
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 <u>table of values</u> 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.

24

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: Specific textbook readings are listed to demonstrate the concepts and material to be covered. The intention is not to focus on particular texts.

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).

Alternate Texts
Finance
- *Corporate Finance* (Fifth Edition), 1999, by Ross, S.A., Westerfield, R.W. and Jaffe, J.
- *Financial Management* (Ninth Edition), 1999, by Brigham, E.F., Gapenski, L.C. and Ehrhardt, M.C.
Interest Theory
- *Mathematics of Investment and Credit* (Second Edition), 1996, by Broverman, S.A.
- *The Theory of Interest and Life Contingencies with Pension Applications: A Problem-Solving Approach,* 1999, by Parmenter, M.M.

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. Note: The electronic copy of this catalog contains a direct link to available SNs.

Code	Title
2-05-01	Course 2 Introductory Study Note
2-09-00	Sample Examination #1
2-10-00	May 2000 Course/Exam 2
2-12-00	November 2000 Course/Exam 2
2-21-00	*Macroeconomics* (Third & Fourth Printing)

Course 3   Actuarial Models

The examination for this course consists of four hours of multiple-choice questions.

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) have the same structure.
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 and using copulas.
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
$$l_x^{(\tau)}, {}_t q_x^{(\tau)}, {}_t p_x^{(\tau)}, {}_t d_x^{(\tau)}, \mu_x^{(\tau)}(t).$$
    - 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, binomial, and the (a,b,1) class of 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 continuous-time Markov chain.
    - Characterize such a process in terms of transition intensity functions and in terms of transition probability functions.
    - Use the Chapman-Kolmogorov equations to calculate probabilities associated with the value of the process at a given time.
    - Use the Kolmogorov differential equations to obtain transition probability functions from the transition intensity functions in special cases.
    - Calculate the limiting distribution of the value of the process.
25. 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.
26. 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.
27. 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).
28. Analyze the impact of reinsurance on the probability of ruin and the expected maximum aggregate loss of a surplus process.
29. Generate discrete random variables using basic simulation methods.
30. Generate continuous random variables using basic simulation methods.
31. Construct an algorithm to appropriately simulate outcomes under a wide variety of stochastic models.

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, Chapter 8, Sections 9.1–9.8, Chapters 10 and 13 (excluding autoregressive discrete-time model and appendix), Section 14.5. Note: Some notation presented in Chapters 13–14 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 and 14.
- *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, 6.1–6.5, 6.8, 10.1–10.4.
- 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 (excluding Example 2.51), 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 the first full paragraph on page 222), 3.6.1, 3.7 (excluding 3.7.1 and 3.7.2), 3.9 (Example 3.29 only), 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 4.6.5.2), 4.8, 4.9.4 (page 336 only), 6.2.3, 6.3.1, 6.3.2.1.
- *Simulation* (Second Edition), 1997, by Ross, S.M., Sections 3.1, 4.1–4.3, Chapter 5 (excluding 5.3), and Chapter 6.
- *Survival Analysis,* 1997*,* by Klein, J.P., and Moeschberger, M.L., Chapters 2–3 (excluding 3.6).

Study Notes

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Code	Title
3-05-01	Course 3 Introductory Study Note
3-09-00	Sample Examination #1
3-10-00	May 2000 Course/Exam 3
3-12-00	November 2000 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

The examination for this course consists of four hours of multiple-choice questions.

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 have the same structure. 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 3–7, 15–18.
- Loss Models*: From Data to Decisions,* 1998, by Klugman, S.A., Panjer, H.H. and Willmot, G.E., Sections 1.5, 2.2–2.6, 2.8–2.10, 3.2.3, 3.3.3–3.3.4, 3.4.2, 3.5, 3.10.1 (beginning with Example 3.34), 5.1–5.5 (excluding 5.4.6 and 5.5.3).
- *Simulation* (Second Edition), 1997, by Ross, S.M., Chapters 7 and 9.

- # *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.

Study Notes

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Code	Title
4-05-01	Course 4 Introductory Study Note
4-09-00	Sample Examination #1
4-10-00	May 2000 Course/Exam 4
4-12-00	November 2000 Course/Exam 4

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 6   Finance and Investments

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.

A "Course Overview" study note 6-20-00 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.

Learning Objectives
The candidate is expected to be able to perform the following actions:
1. Identify and evaluate the risk and return characteristics of various types of investments.
   - Explain the risks to which an investor may be exposed.
   - Evaluate the relationship between risk and return in the investment markets.
   - Explain the general design features and risk characteristics of fixed income and equity investments.
   - Evaluate the risk and return characteristics of government and corporate debt securities.
   - Evaluate the risk and return characteristics of real estate securities.
   - Evaluate the risk and return characteristics of Guaranteed Investment Contracts (GICs).
2. Identify how markets operate and explain the fundamental principles of modern portfolio theory.
   - Explain how individual securities are valued and traded.
   - Evaluate the risk/return trade off from an investor's perspective.
   - Explain the term structure of interest rates including the yield curve and pricing of fixed income securities and spot and forward rates of interest.
   - Explain the Capital Asset Pricing model (CAPM) and its application to portfolio management.
   - Discuss the properties of the Markowitz Portfolio Selection model.
   - Evaluate the three versions of the efficient market hypothesis and explain their application to portfolio management.
   - Discuss the impact of investment diversification upon portfolio management.
   - Explain arbitrage pricing theory and its application to portfolio management.
   - Discuss the impact of behavorial finance on asset prices and financial markets.
3. Determine how options are priced in financial markets.
   - Evaluate the features and risk/return characteristics of financial derivatives including put and call options, swaps, forwards, interest rate caps, floors and compound options.
   - Evaluate the factors that affect the value of an option.
   - Identify the principles and applications of no arbitrage pricing models.
   - Apply binomial option pricing techniques.
   - Determine how options are priced using the Black-Scholes model.
4. Determine the value of cash flow streams with embedded options.
   - Calculate option adjusted spreads including the impact of prepay on Mortgage-Backed Securities.
   - Apply option adjusted pricing techniques to Mortgage-Backed Securities and other financial instruments.
   - Determine the cost and price-yield relationship of an embedded option in a series of cash flows.
5. Apply the concepts of interest rate risk management and effective duration.
   - Explain the concepts of immunization including modern refinements and practical limitations.
   - Calculate an effective duration measure using option adjusted spread analysis.
6. Explain how principles of asset liability management impact portfolio construction and management for institutional investors.
   - Evaluate the impact of liquidity requirements, valuation concerns, cash flow variability, regulatory constraints and investment management mandates in developing investment policies and strategies for insurance and other financial companies and pension plans.
   - Apply ALM principles to the establishment of investment policy and strategy including asset allocation.

- Determine the impact of interest rate risk analysis on portfolio construction.
- Apply matched funding and dedicated portfolio management strategies to control interest rate risk.
7. Identify and apply portfolio management techniques to the ongoing investment management of financial institution and pension fund assets.
   - Explain principles of risk-based capital management and their impact upon portfolio management.
   - Apply principles of active and passive investment management techniques to equity and fixed income portfolios.
   - Evaluate key considerations in developing investment policies and strategies for financial institutions and pension plans.
   - Identify key considerations in managing surplus pension funds.
   - Identify and apply the obligations of a fiduciary in managing investment portfolios.
   - Describe liquidity requirements of an investor and their impact upon portfolio management.

Concepts, principles and techniques needed for Course 6 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
- *†* *Bond Portfolio Management*, (Second Edition), 2001, by Fabozzi, F.J., editor, Chapters 2, 15–16.
- *#* *Investments*, (Fourth Edition), 1999, by Bodie, Z., Kane, A., and Marcus, A., Chapters 1 (background reading only), 2–5, 6 (exclude appendix), 7, 8 (exclude appendix), 9–12, 25.
- *Financial Economics*, 1998, by Panjer, H.H., editor, Chapters 2 (sections 1–6 only), 3, 5–6.
- *†* *Handbook of Fixed Income Securities*, (Sixth Edition), 2000, by Fabozzi, F.J., Chapters 1–2, 5–6, 8, 11, 14, 24, 25, (pp. 573–588, 594–601, and 607–618 only), 26, 28, 29 (pp. 679–695 only), 32 (pp. 739–740, 750–756 only), 34, 37 (pp. 837–846 only), 39, 44–45, 47, 50, and 58.
- *Managing Investment Portfolios*, (Second Edition), 1990, by Maginn, J.L., and Tuttle, D.L., Chapters 7 (exclude pp. 36–69), 8.
- *#* *Valuation of Interest-Sensitive Financial Instruments*, 1996, by Babbel, D. and Merrill, C., Chapters 1 (background only), 2–3, 5 and 8.

Study Notes
Code	Title
6-05-01	Course 6 Introductory Study Note
6-09-00	Sample Examination #1
6-10-00	May 2000 Course 6
6-21-01#	Report on Default and Returns on High-Yield Bonds: Analysis Through 1999 and Default Outlook for 2000–2002
6-23-00	GIC Portfolio Design
6-24-00	Exploiting Behavioral Finance: Portfolio Strategy and Construction
6-26-00	Finding the Immunizing Investment for Insurance Liabilities: The Case of the SPDA
6-27-00	Matched-Funding Techniques
6-28-00	Introduction to the Formation of Investment Strategy for Life Insurance Companies and Pension Plans
6-29-00	Risk-Based Capital for Life Insurers
6-30-00	Liquidity: The Hidden Risk Factor
6-31-00	Fiduciary Liability Issues for Selection of Investments
6-32-00	Investment Management of Retirement Plans in Canada
6-33-00	Asset Performance and Surplus Control: A Dual Shortfall Approach
6-34-00	Managing Pension Fund Investments Chapters 10, 11 (omit 11.08), 13, 14 (14.01-14.05 for background only), 15 (omit 15.08–15.10)

Published References

"A Practical Guide to Interest Rate Generators for C-3 Risk Analysis," TSA XLIV.

"Risk-Based Capital Strategies", RSA, Vol. 20, No. 4A

"CIA Guidance Notes: An Overview of an Investment Policy Statement in an Asset/Liability Management Context", 1994

"CIA Educational Note: Measurement of Exposure to Interest Rate Risk", (including appendices), 1995

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:
      o What is an actuarial model,
      o 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
      o 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:
      o Process error (pure risk),
      o Statistical estimation error,
      o Model selection error,
      o The model versus the universe, and
      o 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.
   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. After receiving a passing score for the pre-test, the successful candidate may then submit an application for a Course 7 seminar.
   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-38-00 Practice Specific Case Study Example
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 two qualifications:

- Has passed Courses 1–6 or has passed five of them and written the final exam for this group but is waiting for results, and
- Has passed the pre-test within the previous 6 months at time of initial seminar registration. If a candidate does not successfully complete Course 7 within 12 months of taking the pre-test, the candidate will be required to pass the pre-test again.

Seminars will be scheduled for 25–40 candidates. 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 and the application of the modeling process to business situations. A second 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 final portion 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.

Readings, 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:

Component	Minimum	Recommended
Processor	Pentium 90 MHz or equivalent	Pentium 166 MHz or equivalent
Operating System	Windows 95 (NT version 4.0 Service Pack 3)	Windows 95 (NT version 4.0 Service Pack 3)
RAM	32 MB (40 MB for NT)	64 MB (80 MB for NT)
Available disk space	15 MB	50 MB
Drive	3.5" diskette	3.5" diskette
Software	Word 97 and EXCEL 97	Word 97 and EXCEL 97

Note: In EXCEL, be sure that Solver and Data Analysis are installed (both appear on the Tools drop down menu when installed). If one or the other is not installed, search EXCEL Help for "install solver" or "install data analysis" and follow the instructions.

The use of Word 97 and EXCEL 97 at the Course 7 seminars shall not be construed as an endorsement of Microsoft products by the SOA.

In addition to the assistance provided in the advance material, seminar faculty will provide assistance as necessary with respect to Word and EXCEL functions during the seminar, including the project time. The faculty will, of course, not be able to provide assistance during the project time with respect to any data analysis or report content. A guideline for project development is that no aspect of the project should put users of spreadsheet software other than EXCEL at a material disadvantage.

A note for non-Word 97 and non-EXCEL 97 users: Course 7 projects have been designed so that users of word processing and spreadsheet applications other than Word 97 and EXCEL 97 will not be at a material

disadvantage. Material distributed in advance of the seminar will include practice problems so that you may become familiar with Word 97 and EXCEL 97 functions needed during the seminar. In addition to this advance material, seminar faculty will provide assistance as necessary with respect to World 97 and EXCEL 97 functions during the seminar, including during the time the project is administered. The faculty will, of course, not be able to provide assistance during the administration of the project with respect to any data analysis or report content.

An equivalent Apple computer is acceptable if it is capable of reading and writing IBM formatted disks. (Note: EXCEL 98 for the MAC is fully compatible with EXCEL 97 for the PC.) You may also bring an electronic calculator for use during the seminar.

We plan to have dedicated computers for the printers provided. However, we cannot guarantee that that will be possible for all seminars. Therefore, we ask that candidates be familiar with how to install printer drivers on their laptop. Normally, the necessary drivers would be on the computer. As backup, in our specifications to the vendor that provides the printers, we are asking that they provide any necessary drivers.

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 the plan completes eligibility processing at the SOA office. 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 the date at which acceptance has been recognized. Candidates will continue to be able to 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 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:

<div align="center">

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

</div>

B. Please allow 6-8 weeks for a response to your executed plan submission.
C. Do <u>not</u> 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. The course will be offered at the SOA Spring and Annual Meetings and at other sites to be determined at a later date. If space is available and as sessions are added, candidates who have completed a minimum of four courses may 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. Therefore, Canadian candidates who attend the CIA course are not required to take the SOA course.

For additional information, please contact Melissa Gullickson at mgullickson@soa.org or 847-706-3563.

Fellowship Admissions Course (FAC)

The final requirement to attain the FSA designation, after all other educational requirements have been completed, is the Fellowship Admissions Course. The FAC can be taken any time after all other 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. 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.

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 *July 2000 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* will have the official description of the Spring 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 courses 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 *July 2000 Examination Program* Booklet.

EA-1 Basic (EA-1) Examination

The EA-1 examination is 2½ hours in length and covers (1) the mathematics of compound interest and practical financial analysis and (2) the mathematics of life contingencies and practical demographic analysis.

Starting with the year 2000, the Joint Board will grant waiver of the EA-1, A examination to any candidate who has received credit from the SOA for Courses 2 and 3 of the SOA's new examination program.

A. Mathematics of compound interest and financial analysis (approximately 25%–50% of the examination)

1. nominal and effective rates of interest and discount, force of interest, accumulated value factors, and present value factors,
2. annuities certain, increasing and decreasing annuities, annuities in which the payment frequency is not the same as the frequency at which interest is compounded, and perpetuities,
3. amortization schedules and sinking funds, including the determination of outstanding principal, the split of payments into principal and interest, and the determination of required periodic payments,
4. bonds and related securities, including bond price formulas, bond accounting, the split of periodic payments into amortization and interest, mortgages, and variable interest securities,
5. determination of fund yield rates and effective rates of return using time-weighted and dollar weighted methods,
6. duration and immunization of cash flows,
7. asset reporting: realized and unrealized gains/losses, book value versus market value, and receivables,
8. financial analysis, including inflation and its role, elements of risk and uncertainty, yield curves and available investments, and employee compensation increases,

B. Mathematics of life contingencies and demographic analysis (approximately 50%–75% of the examination)

1. measurements and demographic analysis of mortality, including the definition and application of standard mortality probability symbols and force of mortality,
2. approximation of fractional period mortality and survival probability,

3. measurement and demographic analysis of disability, employee turnover and employee retirement,
4. adjustments to mortality, disability turnover and retirement rate tables, such as age setbacks and set forwards, select and ultimate tables, projection scales and generation adjustments,
5. life annuities, including life annuities with a term certain,
6. population theory, including complete and curtate expectation of life, central death rates, stationary population, and average ages in a stationary population,
7. multiple life functions, probabilities and annuities,
8. multiple decrement functions, including associated single decrement tables, probabilities of decrement and the construction of multiple decrement tables from associated single decrement tables,
9. principles of actuarial equivalence and related calculations,
10. one-year term costs for ancillary benefits,
11. life insurance, including basic forms, single and annual premiums, varying insurance, and insurance and annuity relationships.

Suggested Readings (selected by the Joint Board):

Texts
- *Actuarial Mathematics*, (Second Edition), 1997, by Bowers, N.L., Jr., Gerber, H.U., Hickman, J.C., Jones, D.A. and Nesbitt C.J., (excluding Chapters 1–2, 12–17, 20–21). First Edition (1986) may also be used (excluding Chapters 1–2, 11–13.)
- *Introduction to Mathematics of Demography*, (Third Edition), 1997, by Brown, R.L., Chapters 3 and 5.
- *Life Contingencies*, (Second Edition), 1967, by Jordan, C.W. **(Note: Out of Print)**
- *Life Contingencies—A Guide for the Actuarial Student*, (Second Edition), 1998, by Batten, R.W.
- *Mathematics of Investment and Credit,* (Second Edition), 1996, by Broverman, S.A.
- *Survival Models and Their Estimation*, (Third Edition), 1997, by London, D., Chapters 3–7.
- *The Theory of Interest*, (Second Edition), 1991, by Kellison, S.G.
- *The Theory of Interest and Life Contingencies with Pension Applications: A Problem-Solving Approach*, (Third Edition) 1999, by Parmenter, M.M.

Additional Readings
- Actuarial Standards of Practice, No. 27, "Selection of Economic Assumptions for Measuring Pension Obligations"
- Actuarial Standards of Practice, No. 35, "Selection of Demographic and other Noneconomic Assumptions for Measuring Pension Obligations"

Study Notes (selected by the SOA)

Code	Title
EA1-24-91	Actuarially Equivalent Benefits
EA1-61-91	Measurement of Investment Return

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.

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

The EA-2, Segment B examination is 2½ hours in length and 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. The EA-2, Segment B examination presupposes knowledge of the topics covered in EA-2, Segment A and in the EA-1 examination.

Syllabus

1. Requirements with respect to reporting and disclosure, including underfunded plans, reductions in future benefit accruals, and reportable events,
2. non-discrimination requirements including those related to plan participation, coverage, and permitted disparity,
3. requirements with respect to vesting, service credits, employee contributions, accrued benefits, normal retirement, early retirement, postponed retirement, joint and survivor annuities, and preretirement death benefits,
4. maximum benefit limitations,
5. additional requirements with respect to top-heavy plans,
6. requirements with respect to mergers and spin-offs, including those in the Internal Revenue Code and in Title IV of ERISA,
7. PBGC premium requirements,
8. plan termination requirements including, standard and distress terminations, involuntary terminations, missing participants, guaranteed benefits, allocation of assets, plan liability and employer liability,
9. withdrawal liability and reorganization under multiemployer plans,
10. excise taxes other than for funding requirements,
11. prohibited transactions and fiduciary standards,
12. standards of performance and professional conduct for enrolled actuaries.

Study Notes (selected by the SOA)

Code	Title
E2B-24-96	Pension Plan Terminations
E2B-25-90	Multiemployer Pension Plans Amendment Act of 1980
EA2-33-00	IRC Section 401
E2B-34-96	IRC Section 410
E2B-50-97	IRC Section 411
E2B-36-97	IRC Section 413
E2B-37-98	IRC Section 414
E2B-38-00	IRC Section 415
E2B-39-90	IRC Section 416
E2B-40-98	IRC Section 417
E2B-41-00	Practical Approach to Section 415 Limits
E2B-44-99	Update to E2B-24-96
E2B-53-00	Reportable Events and Form 200 Requirements
E2B-54-00	Circular No. 230 (Section 10.3)
E2B-55-00	Tax Forms and PBGC Contacts

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. A second 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 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 advantaged or disadvantaged. During the final 24 hours 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 students 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.

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, asset-liability management, performance objectives, solvency, and ethics.

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-1, Segment B, 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 exam 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 Cathy Cimo, E&E Ombudsperson, at the SOA office (telephone 847-706-3527, fax 847-706-3599, or e-mail ccimo@soa.org.)

± 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—SPRING 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	Brigham, E.F., Gapenski, L.C. Ehrhardt, M.C.	*Financial Management* (Ninth Edition), 1999, Harcourt/Academic Press.
2	Broverman, S.A.	*Mathematics of Investment and Credit* (Second Edition), 1996, ACTEX Publications.
2, EA-1	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.
2	Parmenter, M.M.	*The Theory of Interest and Life Contingencies with Pension Applications: A Problem Solving Approach,* 1999, ACTEX Publications.
2	Ross, S.A., Westerfield, R.W., Jaffe, J.F.	*Corporate Finance* (Fifth Edition), 1999, Irwin/McGraw-Hill.
3	Bowers, N.L., Gerber, H.U., Jones, D.A., Hickman, J.C., Nesbitt, C.J.	*Actuarial Mathematics* (Second Edition), 1997, SOA.

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† Indicates a **new edition** or a first time use of a **new textbook**.

Course(s)	Author(s)	Title
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).
3, 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	Pindyck, R.S., Rubinfeld, D.L.	*Econometric Models and Economic Forecasts (*Fourth Edition), 1998, Irwin/McGraw-Hill.
6	Babbel, D. Merrill, C.	*Valuation of Interest—Sensitive Financial Instruments*, 1996, Frank J. Fabozzi & Associates.
6	Bodie, Z., Kane, A., Marcus, A.	*Investments*, (Fourth Edition), 1999, Irwin/McGraw-Hill.
†6	Fabozzi, F.J. (editor)	*Bond Portfolio Management,* (Second Edition), 2001, Frank J. Fabozzi & Assoc.
†6	Fabozzi, F.J. (editor)	*Handbook of Fixed Income Securities*, (Sixth Edition), 2000, Irwin/McGraw-Hill.
6	Maginn, J.L., Tuttle, D.L.	*Managing Investment Portfolios*, (Second Edition), 1990, available through book distributors listed.
6	Panjer, H.H. (editor)	*Financial Economics*, 1998, The Actuarial Foundation, order from book distributors or SOA.
EA-1	Batten, R.W.	*Life Contingencies—A Guide for the Actuarial Student*, (Second Edition), 1998, ACTEX Publications.
EA-1	Bowers, N.L., Jr. Gerber, H.U. Jones, D.A., Hickman, J.C. Nesbitt, C.J.	*Actuarial Mathematics*, (Second Edition), 1997, SOA.
EA-1	Broverman, S.A.	*Mathematics of Investment and Credit*, (Second Edition), 1996, ACTEX Publications.
EA-1	Brown, R.L.	*Introduction to Mathematics of Demography*, (Third Edition), 1997, ACTEX Publications.
EA-1	Jordan, C.W.	*Life Contingencies*, (Second Edition), 1967, SOA. **[Out of Print]**
EA-1, 2	Kellison, S.G.	*The Theory of Interest*, (Second Edition), 1991, Irwin/McGraw-Hill.

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† Indicates a **new edition** or a first time use of a **new textbook.**

Course(s)	Author(s)	Title
EA-1	London, D.	*Survival Models and Their Estimation*, (Third Edition), 1997, ACTEX Publications.
EA-1	Parmenter, M.M.	*The Theory of Interest and Life Contigencies with Pension Applications: A Problem-Solving Approach*, (Third Edition), 1999, ACTEX Publications.

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† Indicates a **new edition** or a first time use of a **new textbook.**

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