

**THE EDUCATIONAL CONTENT  
OF THE CAS SYLLABUS**



## THE EDUCATIONAL CONTENT OF THE CAS SYLLABUS

This report has been prepared by the Long Range Planning Subcommittee of the Syllabus Committee at the request of the Board of Directors of the CAS. The purpose is to evaluate the educational content of the syllabus from the standpoint of the educational needs of future actuaries. The subcommittee has been reviewing Syllabus content for several years in terms of a long range comprehensive plan for educating actuaries. The subcommittee was expanded for this project to include a representative of the Educational Policy Committee. In addition, the Report reflects comments from the full Syllabus Committee.

The report draws upon the results of the CAS Membership Survey in evaluating the current Syllabus and subjects which were identified by the survey for inclusion in the Syllabus. The subcommittee is also indebted to Michael Walters and John Muetterties for their thoughtful discussions of future educational directions as presented in recent articles in the Actuarial Review and The Actuarial Update, respectively. The committee has incorporated some ideas from recent discussions of "the actuary of the future".

### The Actuary of the Future

For many years, the actuary's focus has been on the liability side of the balance sheet. It seems clear that the actuary of the future will increasingly be required to look at the asset side as well. The subject of matching of assets and liabilities in terms of duration and suitability has already received increased attention and several articles on this subject have now been added to the Syllabus. Future actuaries will be increasingly involved in the investment side of the business. This focus is not necessarily restricted to insurance companies but would also apply to self-insurance and other funding mechanisms.

A related area in which the actuary is already becoming more involved is Finance. In recent years, more emphasis in the insurance pricing arena has been placed on rate of return and the cost of capital. Questions posed include the relative risk of the insurance industry as compared to other industries, the financial structure of the industry (leverage ratios, etc.), the profitability of the industry, the need for a contingency margin and the allocation of surplus to line and state. Various methods have been presented for determining the cost of capital (Discounted Cash Flow, Internal Rate of Return, the Capital Asset Pricing Model, etc.). Finance is an appropriate area for further actuarial involvement.

In an increasingly complex and socially conscious era, legislators, regulators, and others are looking for actuarial advice to understand the cost implications of relevant social and political proposals. To the extent that the actuary is viewed as professional and objective, that advice will be sought and valued. This suggests several important qualifications for the actuary of the future. The first is communication skills, for without these skills the result of the actuary's work will go unheeded or given little weight. Secondly, the actuary must be viewed as a professional. Hence, integrity, discipline, professional standards of practice and guides to professional conduct are very important.

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More and more, employers are looking for actuaries with a broader perspective, going beyond the traditional technical skills. They are looking for actuaries who possess communication and management skills. These employers are looking for greater competence in such skills as problem identification, dealing with unstructured situations, applying interdisciplinary approaches, conceptualization, and creativity.

Actuaries will be called on to play a larger role in the arena of regulation. Actuarial certification is currently expanding into new areas. Regulators want actuaries to certify reserves and other balance sheet items to assure that these have been estimated in a professional, objective manner and fairly stated. Actuaries also may be called on to take a larger role in attesting to ratemaking procedures and results.

We will see broader application of actuarial techniques. Actuaries have demonstrated the ability to quantify difficult problems using a variety of methods and models. These techniques can and will be applied to other areas than the traditional insurance problems. Initially, these areas will likely be offshoots of insurance and risk management fields.

Actuaries will become more international. As financial institutions and businesses become multi-national, actuarial work will likely expand. Actuaries will need to become more knowledgeable about the insurance and risk management systems in other countries.

The actuary of the future will be a problem solver but with a broader perspective, an expert at quantifying difficult problems with a variety of scenarios. The actuary will play a greater role in areas such as economics, finance and government. Due to this increased role, he or she will play a more active part in dealing with many difficult social problems and must be able to communicate. He or she must be viewed as a professional, with professional standards of practice and conduct.

Intellectual Core of the Profession

Is there a common core to all of this? What distinguishes actuaries from practitioners of related disciplines such as economics, accounting and general mathematics? What makes the actuary unique?

Jim Hickman recently referred to the "intellectual roots" of the actuarial profession. We believe that the core upon which the casualty actuarial profession is built is a thorough grounding in the following as applied to property/casualty risks:

- Applied Mathematics
- Economics
- Finance
- Risk Theory

All of these disciplines come together in evaluating current financial implications of future contingent events; this has been advanced as the definition of an actuary and may be the best definition possible.

As we strive to educate actuaries of the future, we must begin by instilling a strong base of knowledge in these core areas. In effect, we will be molding an actuary who begins as a generalist, trained in the fundamentals and principles of applied mathematics, economics, finance, and

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risk theory as applied to property/casualty risks. As the actuary's knowledge and experience base expands, specialization will occur. However, as actuaries move forward in various career directions, this intellectual core will travel with them and will provide them with a firm base from which to grow.

Educational Issues

With this backdrop, we need to examine our current educational process to see whether it is providing the necessary training in the intellectual core for the actuary of the future. We have identified the following issues as important to the educational process:

- Balance of Mathematical vs. Non-Mathematical Subject Matter
- Sequencing of Subject Matter
- Conceptual vs. Factual Material
- Canadian Content
- Associateship vs. Fellowship Examinations
- Communication Skills
- Management Skills
- Professional Standards
- Development of Syllabus Materials

Each of these issues will be discussed in more detail in the following paragraphs.

Balance

Actuaries must master both mathematical and non-mathematical subject matter. If we "over-focus" on mathematical topics, we may not provide the broad background desired to allow actuaries to solve problems creatively, using different disciplines. In addition, there is a real danger that an "overkill" on heavy mathematics will discourage non-mathematicians from entering the profession. These non-mathematicians may possess the desired communications, management, and general business problem-solving abilities. Given that we want to retain our mathematical roots within the core of our profession, we must strive to find a proper balance on the Syllabus between mathematical and non-mathematical subject matter.

Sequencing of Subject Matter

There has been some discussion in recent years about whether all of the mathematical subjects should be kept to the early examinations. We do not believe that as soon as an actuary achieves the associateship designation, he or she loses the ability to handle mathematics. In fact, it would be impossible to properly cover advanced ratemaking and excess pricing without significant mathematical content. Since we have cited applied mathematics as a part of the core of our profession, we believe that "mathematical subjects" should be presented through all levels of the educational process for the actuary.

By the same token, we feel that non-mathematical content could be introduced earlier in the examinations (for example, at the Part 3 level). This would allow students to study material early on in the examinations which would be more relevant to their work than pure mathematics.

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Another issue in sequencing is whether or not certain examinations or subjects should be prerequisites for later exams. We don't see the need for this under the current Syllabus, although it should be further considered under the proposed flexible education system.

### Conceptual vs. Factual

Given our mathematical foundation, how do we focus the educational process on the problem-solving skills for which we are looking? This concern also appeared on the Membership Survey from a slightly different perspective. Specifically, do examination questions focus enough attention on understanding and problem-solving as compared to list recitation? While these are related issues, we believe that the latter question is not primarily a question of educational content. It, instead, is an issue that should be addressed by the Examination Committee or the new Task Force on Educational and Testing Methods. As to the first question, we believe that the Syllabus needs to be broad enough to give the student both factual information as well as conceptual perspectives. Although practical applications of the theory and principles should be included, we need to emphasize that these applications are not important in and of themselves, but as examples of the application of problem-solving techniques to particular problems. In addition, as a general principle, readings that emphasize problem solving are desirable and should be sought.

### Canadian Content

In general, insurance concept material probably does not fall into the category of being nation-specific. A general insurance concept should be applicable regardless of country and, therefore, would not pose a problem in either testing or development of material for the Syllabus. In developing this kind of material, the committee would consider any published material, regardless of the country of publication, as long as the material satisfies the criterion of generality of concepts. However, as stated above, we believe that the presentation and testing of factual material should also be part of the educational process, especially when the facts serve as examples which help make a general concept more specific. Thus, it is both feasible and proper to improve the balance, throughout the whole Syllabus, between U.S. and Canadian examples of general insurance concepts.

We also believe that some fact teaching and testing is necessary as we educate future actuaries. Rather than including a separate track with Canadian content for Canadian students, we believe that all casualty actuaries should study the same material and take the same set of examinations which would qualify them to practice in North America. All that would be required from a practical point of view would be the establishment of a minimum amount of factual information which would satisfy Canadian needs and U.S. needs and the development of that material to the extent that current materials are insufficient.

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Associateship vs. Fellowship Examinations

The Syllabus for Associateship should have the general objective of developing an ACAS who is competent technically to practice ratemaking and reserving. This would include the following Syllabus subjects:

- mathematical foundations
- property/casualty coverages and operations
- risk theory
- economics
- finance
- ratemaking
- individual risk rating
- reserving
- accounting
- insurance rate regulation

The following subjects would be covered in the Fellowship Syllabus:

- more advanced treatment of certain of the above subjects
- statutory insurance
- reinsurance
- valuation
- insurance law and regulation

The Syllabus should have the general objective of developing an FCAS who has a solid knowledge of the core areas of the profession.

Communication Skills

Communication skills have been identified as vital to the success of future actuaries. The application of these skills will run the gamut from inter-office memoranda to presentations before Congress. While the importance of communication skills has been recognized for many years and discussed numerous times at Syllabus Committee meetings, the consensus has been that this subject is not suitable for the examination process with its emphasis on self-study.

Reexamination of the subject in the light of the actuary of the future has convinced us that this subject may be too important to be left to individual development. We therefore recommend a three-pronged approach to the subject.

- (1) The Syllabus Committee should investigate the feasibility of adding to the exam syllabus the subject of Argumentation: the presentation of ideas in a logical and persuasive manner.
- (2) Exam questions offer an opportunity to test actuaries' communication skills. The Examination Committee should be encouraged to develop essay questions which not only test facts and concepts, but the ability to present these ideas clearly. A statement to that effect could be put in the Syllabus.

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We would also raise the question as to whether our examination process in general, with its emphasis on short answer and multiple choice questions, is effective in emphasizing communication skills. This question is more properly a question for the Examination Committee and the new task force on Educational and Testing Methods.

- (3) The Continuing Education Committee should consider the feasibility of offering a regular seminar on communication skills. Ideally, this would be taught by experts in the field, who would structure the seminar towards presentation of technical subjects such as actuarial analyses.

### Management Skills

We have identified these skills as important to many future actuaries. However, given the volume limitations of the Syllabus, it is impossible to cover everything that would be valuable for actuaries. There has to be a prioritization. In addition, the Syllabus may not be the best place to teach this subject. There are a variety of courses already available on the subject which are taught by experts in the field. Many employers offer such courses to their actuaries as well as other employees who are potential management candidates. Given an already crowded Syllabus, with indicated new material on finance and other subjects, we have concluded that this subject should not be added to the Syllabus at this time. However, due to its importance to future actuaries, we recommend that it be considered by the Continuing Education Committee as soon as possible.

### Professional Standards

Should the educational process for the actuary of the future include the topic of professional standards, including ethics? We believe that an emphasis should be placed on the need for professionalism. Therefore, we believe that no actuary should attain the Associateship designation without studying the Guides to Professional Conduct. This topic need not be a direct part of the examination process. A special seminar or a session at the CAS meeting are two possible arenas for presentation. In addition, as Statements of Principles and/or Standards of Practice are promulgated, we believe they should be strongly considered for addition to the Syllabus. To the extent they are not added to the Syllabus, they should be considered as part of the special seminar for new Associates.

### Development of Syllabus Materials

A review of educational issues would not be complete without discussion of the quality of the educational materials currently on the Syllabus and the development of readings in the future. While the quality of much of the current educational material is excellent, it is recognized that the material is voluminous and repetitive in many areas. An obvious solution is the replacement of outdated and general readings with study notes or articles specifically tailored for CAS students. We have tried for several years to encourage the writing of these study notes and have, together with the Committee on Research, published lists of topics for which papers are needed. To date, we have not met with much success in this area. An



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alternative, which will be attempted in 1989 will be to form a subcommittee of the Syllabus Committee which will identify specific materials needing updates or replacements, in priority order, and attempt to identify and encourage prospective authors. In addition, with the success of the CAS Textbook Committee on Foundations of Casualty Actuarial Science, this committee could be continued to work on some of the most important papers.

Summary

In summary, the actuary of the future will have a broader role, both within the property/casualty industry, and will expand into other areas outside the traditional insurance industry. To be prepared to meet these increased challenges, we must establish a solid educational program which provides the actuary of the future with an intellectual core of knowledge in applied mathematics, economics, finance, risk theory, and the property/casualty insurance business.

The educational process which will be required in order to achieve the necessary results should:

- include both mathematical and non-mathematical subject matter throughout the entire educational process
- provide the student with both factual information as well as conceptual perspectives
- endeavor to include one track of study material and examinations which would provide the training needed for both Canadian and U.S. actuaries to practice in North America
- include communications skills through a combination of Syllabus material, examination structure and Continuing Education Seminars
- present management topics in a continuing education format
- include the study of all published Statements of Principles and Standards of Practice; and
- require the study of the Guides to Professional Conduct as a prerequisite for the Associateship designation
- strive to maintain a Syllabus of updated readings tailored for CAS students

In addition, there must be greater coordination of the Educational and Examination Committees in order to effectively meet these challenges. By meeting all of these goals, the actuary of the future will be prepared to face the ever broadening role that we foresee.

The Appendix, which follows, provides a detailed description of the subjects that are currently on the Syllabus that should be included or deleted in the future, as well as any new subjects which should also be included. There is also a brief discussion of subjects considered for inclusion but not recommended.

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Recommendations

Based on the report and the detailed Appendix, we recommend the following actions be taken:

- (1) The subjects for inclusion and deletion to the Syllabus as set forth in the Appendix should be evaluated and incorporated into the Syllabus by the Syllabus Committee over time in an orderly fashion.

In particular, the following major changes are recommended:

- a) Elimination of Operations Research as a separate examination part.
  - b) Earlier examination treatment of Property/Casualty coverages, operations of insurance companies and introductory basic material on ratemaking and reserving.
  - c) Move Forecasting to an Associateship topic  
e.g. inclusion with Applied Statistics.
  - d) Addition of Finance
- (2) The Continuing Education Committee should be asked to consider communication skills and management skills as subjects for seminars, meeting topics, or other appropriate forums.
  - (3) The Examination Committee should consider the question of how communication skills can be most effectively tested in the examination process and evaluate whether our current examination structure places appropriate emphasis on these skills.
  - (4) The Syllabus Committee should investigate the feasibility of adding to the exam Syllabus the subject of Argumentation: the presentation of ideas in a logical and persuasive manner.
  - (5) A seminar or a session at a CAS meeting on the Guides to Professional Conduct should be added to the requirements for an Associate of the Society.
  - (6) Additional Canadian content should be added to the Syllabus to provide a balanced single track of examinations.
  - (7) The Syllabus Committee should continue its efforts to develop additional study notes and other materials specifically tailored for actuarial students. The Syllabus Committee would identify needed material and work with the VP--Development to get the necessary material produced.

## Appendix

## SYLLABUS REVIEW

I. Subjects for InclusionA. Mathematical Foundations

1. Calculus--The equivalent of a one year calculus course should be required of all CAS students.
2. Linear Algebra--Students should know enough matrix algebra to solve systems of linear equations and understand the matrix formulation of multiple regression analysis.
- 3,4. Probability and Statistics--The level of the current Part 2 is appropriate. It should be noted that relevant statistical evaluation is part of the later exams.
5. Forecasting--The student should master simple and multiple linear and non-linear regression, as well as some time series methods and Delphi methods. Fitting of models, testing goodness of fit, testing for failure of regression assumptions, and measuring possible deviations from forecast values should all be mastered. We recommend that a joint CAS/SA Committee reevaluate the Part 3 Intermediate Business Statistics course to see if forecasting could be included.
6. Numerical Analysis--Numerical methods of integration, minimization, graduation and curve fitting, and solving systems of non-linear equations should be learned. We believe this Part 3 exam should also be reevaluated by a joint committee to make it more relevant for actuaries.
7. Theory of Interest--A basic introduction: simple and compound interest; present value and discount; force of interest; perpetuities; continuous and varying annuities; unknown rate and time, is enough for the initial exam on this topic. More advanced material, such as internal rate of return and the valuation of bonds, stocks, and options should be part of the new Finance subject.
8. Credibility Theory--A thorough grounding in credibility theory should be included. In addition, students should learn how to estimate credibilities from data, including the case of unequal cell sizes and model testing.
9. Loss Distributions--Frequency, severity, and aggregate loss distributions should be studied, including estimation of parameters by maximum likelihood in cases of complete and limited (grouped, truncated, censored) data, estimation of confidence bands for the probabilities using the information matrix, calculation of aggregate moments and probabilities from frequency and severity distributions by practical computer methods, and calculation of excess probabilities and costs.

I. Subjects for Inclusion (continued)B. Property/Casualty Coverages and Operations

1. Coverages--Before analyzing a body of data (whether for ratemaking, loss reserving, etc.), the actuary must know the parameters defining that body of data. A key parameter is the coverage applicable. The characteristics of the data may vary substantially depending upon the line of insurance and the coverage provided by the insurance contract. It is critical that the actuary understand the different coverages and the exposures to loss that these coverages were designed to address.
2. Operations (Underwriting, Marketing, Claims)--In order to understand the insurance business, the actuary must have a knowledge of the underwriting, marketing and claims functions. The actuary must understand how changes in these functions may impact data used for ratemaking, loss reserving and other analyses.

C. Risk Theory

As risk (uncertainty) is an integral part of ratemaking, reserving, etc., the actuary must be able to apply appropriate techniques for addressing risk. Furthermore, the actuary as a member or observer of a corporate structure must appreciate financial risk. In general, the actuary should know the kinds of risk and the ways in which they can be handled for property/casualty insurance.

Specific subjects that should be covered include: frequency and severity distributions; Poisson processes, compound Poisson processes, and diffusion processes; calculation of aggregate loss moments and probabilities; calculation of excess loss percentages; probabilities of adverse deviation over a time period; premium calculation principles.

D. Economics

In projecting or developing data, the actuary must estimate the impact of inflation and other economic factors on the data. Consequently, the actuary should understand the principles of economics and how a competitive economy functions, particularly its impact upon the insurance industry. The specific topics which should be included in the Syllabus are:

- supply and demand (on a macroeconomic and microeconomic basis)
- price, utility, costs and competition
- consumption, investment, fiscal policy and inflation
- money, interest rates and deficits
- exchange rates and international finance

E. Finance

A subcommittee of the Syllabus Committee has identified several Finance topics which are appropriate for inclusion in the Syllabus. These include: present value, opportunity cost of capital, risk and return, internal rate of return, capital asset pricing model, options, analyzing financial performance, valuing risky debt, mergers, and international financial management.

Basic finance material at the Associateship level will provide a background for more advanced Finance material at the Fellowship level and prepare the actuary to pursue continuing education in financial theory. Material on valuation will likely be enhanced by the study of Finance topics.

I. Subjects for Inclusion (continued)F. Ratemaking and Individual Risk Rating

The Syllabus should include both basic and advanced material which deal with the topics of ratemaking and individual risk rating. The papers should present comparisons of various ratemaking and individual risk rating techniques in order to help the candidate learn how to evaluate and select appropriate techniques for a given problem. In addition, there should be more technical material which should prepare the student to deal with a wide range of problems, including those for which there are not generally recognized solutions.

The topics which should be part of the Syllabus should include:

1. Ratemaking

- general principles of ratemaking
- loss development, trend, credibility
- classification ratemaking, including risk classification
- excess and deductible ratemaking, and
- data for ratemaking

2. Individual Risk Rating

- experience rating
- retrospective rating
- schedule rating, and
- composite rating
- merit rating, dividend plans, loss rating

G. Reserving

An actuary may be expected to design and test reserving methods, should be familiar with the general principles of reserving, should be able to complete Schedules O and P of the Annual Statement, and should be prepared to discuss such topics as:

1. The selection and evaluation of a loss reserving method appropriate to a given line of insurance:
  - a) For known claims
  - b) For IBNR claims
  - c) For all incurred claims
2. Testing of adequacy of previous loss and loss expense reserve levels.
3. Evaluating the adequacy of current loss and loss expense reserve levels.
4. The identification of, and correction for, effects on loss reserves stemming from:
  - a) Changes in the loss climate
  - b) Changes in a company's handling of claims
  - c) Data problems

I. Subjects for Inclusion (continued)G. Reserving (continued)

5. Special reserving problems in a line arising from:
  - a) Catastrophe losses
  - b) Reopened claims
  - c) Policies on a claims-made rather than occurrence basis
  - d) Fidelity and Surety IBNR
  - e) Credit insurance
  - f) Late recorded premiums (earned and unearned)
6. The unearned premium reserve:
  - a) Improving its accuracy
  - b) The reserve for retrospective returns
  - c) Policies on a claims-made basis
  - d) Deposit premium policies
7. Allocated loss expense reserves.
8. Unallocated loss expense reserves.
9. Statutory Annual Statement reserves.

To support these goals, techniques other than chain ladder need to be covered. Chain ladder on paid, incurred, accident year, report year, etc. is one technique, not several. Testing the strengths and weaknesses of various methods also needs to be covered. Exposure based methods, credibility methods, curve fitting, regression methods, and fitting of lag distributions are examples of various methods that could be included. Estimation of confidence intervals for the loss liability should also be covered. It is appropriate to emphasize adjustments needed to react to changes in data and testing of reserving assumptions. The actuary should also be familiar with the subject of discounting of reserves and with the concepts of deferred acquisition expenses, premium deficiency reserves, dividend reserves and deferred tax liabilities.

H. Accounting, Expense Analysis, and Published Data1. Accounting

Students should learn and be tested on accounting concepts, income statements and balance sheets, and the need for and methods of maintaining audit trails in computer based systems, and tax accounting. Statutory and GAAP insurance accounting should be covered in depth, and FASB rulings relevant to insurance issues should be studied as well. All Associates should know the U.S. Annual Statement blank, as well as major differences between the U.S. and the Canadian statements. Also, valuation differences and solvency standards in European statements should be studied, in part to understand how else it can be done, and in part to be able to analyze foreign reinsurance and insurance.

2. Expense Analysis

The current emphasis is appropriate, but a more up to date study of expenses by size of risk is needed. We also need a paper on expense flattening and/or other expense topics. These latter items are really more in the ratemaking area.

I. Subjects for Inclusion (continued)H. Accounting, Expense Analysis, and Published Data (continued)3. Published Data

More rationale is needed for this to be on the examinations than for students to know it is there. Periodically sending CAS members a detailed reference list of these data sources, including what is on each, should be considered as an alternative to keeping this section.

I. Statutory Insurance

This topic includes insurance required by the government and insurance provided by the government. It is appropriate for CAS students to know the different forms that both have taken in various jurisdictions, and the reasons for them. This should probably be restricted to Property and Casualty lines broadly construed. Students should be exposed to enough material on social security to evaluate the interaction between social security and Workers' Compensation, first party Medical benefits, and third party liability settlements. Both U.S. and Canadian systems should be studied by all students, as examples of the diversity employed. Systems from other countries should also be reviewed and included to the extent that they illustrate alternative perspectives.

J. Insurance Law

This subject provides a background and basic understanding of how tort law underlies and affects the insurance contract. In addition, the actuary should be knowledgeable about the various state and provincial laws which affect ratemaking, reserving, and other actuarial issues.

K. Insurance Regulation

The actuary needs to have an understanding of the system of regulatory controls within which the insurance business operates. The basis for insurance regulation is the law of the particular jurisdiction, either state, provincial or federal. The actuary should be knowledgeable about the purposes of regulation, types of rate regulation in use, and issues of concern to regulators.

L. Reinsurance

This topic continues to rate very high on interest surveys of actuaries. Reinsurance is crucial to almost any insurance or self-insurance program.

The topic of excess rating, or the mathematics of reinsurance pricing, is covered in another section. The Syllabus should contain sufficient material on the general subject of reinsurance concepts so that actuaries who are responsible for either assumed or ceded reinsurance operations are familiar with the functions of reinsurance and its purpose.

Reinsurance plays a large role in the management of the solidity of insurance systems through the use of risk reduction. Actuaries should understand this relationship and how the various forms of reinsurance are designed to enhance the viability of primary insurance programs. This subject can also be related to material on regulation.

The Syllabus should not provide all material which may be of interest to actuaries directly working in reinsurance but, rather, should provide a sufficient understanding of reinsurance concepts and the development of a well-managed reinsurance program.

I. Subjects for Inclusion (continued)M. Valuation

The past few years have seen increased interest in acquisitions and mergers in the insurance industry. This has given rise to requests for valuations of insurance companies.

In addition, regulators have expressed more interest in the relationship of assets and loss reserves with respect to loss reserve opinions. There is a growing awareness of the need for actuaries to consider the appropriateness and the valuation of the assets as well as the proper estimation and statement of liabilities.

A new section has been added to the Syllabus dealing with this topic. Future Syllabus material should be kept current with developments in this area.

N. Investments

While most of the major functions of an insurer pertain to the business of insurance, the investment of policyholder surplus and premiums is necessary to meet future liabilities and ultimately critical to the solvency and profitability of the insurer. The actuary must understand the importance of asset and liability matching and alternative investment instruments including their risk maturity, expected yield, and tax characteristics.

O. Professional Principles and Standards

The actuary should have a thorough understanding of the principles, professional standards, and guides to professional conduct of the profession and the discipline process which enforces them. The Syllabus should include study of the principles and, perhaps, standards of practice of property/casualty actuaries.

P. Communication Skills

As summarized in the body of this report, the subject of argumentation or presentation of ideas in a logical and persuasive fashion should be considered for inclusion in the Syllabus.

Q. Health and Group Insurance

Topics covering basic ratemaking for health insurance and group insurance are currently included in the CAS Syllabus. Some actuaries give a very low ranking to the importance of ratemaking of health and group insurance. However, a number of casualty actuaries do practice in health related areas and it is felt that a basic understanding of the fundamentals of ratemaking for health and group insurance should be obtained.

The articles that are on the current syllabus which deal with health and group insurance are very outdated (1962 and 1965). It is believed that if more current material were found which gave a better presentation of the fundamentals of health and group insurance ratemaking, then these topics should continue to be a part of the education of a casualty actuary.



## II. Subjects for Deletion or Reduction

### A. Operations Research

Operations Research material is and will be, less relevant to a casualty actuary than deemed in the past. Topics of limited relevance or applicability include project scheduling, dynamic programming, integer programming, and queuing theory. Therefore, a separate examination part on Operations Research should be deleted from the Syllabus. However, topics such as simulation and decision analysis are felt to be of continued relevance and should continue to be included on the CAS Syllabus.

### B. Nuclear Risk

Material on nuclear risk, including the Price-Anderson Act, have minimal applicability for a casualty actuary. Regulatory issues for coverages mandated by statute or regulation are covered elsewhere in the Syllabus with more relevant presentations of regulation for automobile insurance, workers compensation, and social security. Thus, specific readings pertaining to Nuclear Risk should be considered for deletion from the Syllabus.

### C. New York Insurance Law/Canadian Provincial Acts

While the New York Insurance Law has been deemed typical of state insurance laws, it is felt that studying the actual statutes does not add significantly to the casualty actuary's understanding of the fundamentals of regulation with one exception. The exception is the rating statute which should be continued because of the importance of these statutes to actuarial work. With that exception, more value will be achieved by including material which helps the candidate understand the fundamentals of regulation. The inclusion of specific state laws should be reduced or deleted from the Syllabus. Similarly, the details of the various Canadian provincial acts should not be studied except as examples of the regulatory principles. A Canadian ratemaking statute similar to New York would be appropriate.

### D. Life Contingencies

The casualty actuary should have a working knowledge of the mathematics of life contingencies. However, the scope of the material presently included on the Syllabus is broader than what is necessary for a casualty actuary. Thus, some life contingency topics should be considered for reduction on the Syllabus, e.g. life insurance reserves.

## III. Subjects Considered for Inclusion but Not Recommended

Many subjects have been suggested through various channels (e.g. Syllabus and Education Committees, presidential addresses, regional actuarial clubs, etc.) for inclusion on a Casualty Actuarial Society Syllabus. Some of these subjects and topics include

- General Business Management
- Life Insurance and Pension Plans
- Public Relations

As FCAS's proceeds through the various directions of their careers, business management and skills are usually required; public relations skills are needed by some actuaries; and knowledge of life insurance and pension plans is useful to a smaller number of casualty actuaries. However, these subjects are not required in the development of qualified professionals in the field of casualty actuarial science. Instead, these subjects may be better presented as part of a continuing education program offered by the CAS.

