REGULATIONS FOR THE DEGREE OF BACHELOR OF SCIENCE IN ACTUARIAL SCIENCE (BSc[ActuarSc])

These regulations apply to students admitted in the academic year 2004-2005 or thereafter.

(See also General Regulations and Regulations for First Degree Curricula)

The degree of Bachelor of Science in Actuarial Science is an undergraduate degree, awarded for the satisfactory completion of a prescribed course of specialist training in actuarial science.

Definitions

AS1[(1)] In these Regulations, and in the Syllabuses for the degree of BSc(ActuarSc), unless the context otherwise requires —

'Course' means a course of instruction which normally carries 6 credits or in some cases 3 credits or multiples of 3, leading to one examination paper as defined in the syllabus;

'Paper' means one or more of the following tests: a theoretical examination paper, a practical examination paper, an assessment of field practice, a thesis, and a dissertation, or other assignments as prescribed in the syllabus of the course leading to it;

'Credits' means the weight assigned to each course relative to the total study load. The number of credits is indicative of the contact hours and/or study time associated with the course on a weekly basis;

'Pre-requisite' means a course which candidates must have completed as specified to the satisfaction of the Head of Department before being permitted to take the course in question.

Admission to the degree

AS2 To be eligible for admission to the degree of Bachelor of Science in Actuarial Science candidates shall

(a) comply with the General Regulations;
(b) comply with the Regulations for First Degree Curricula; and
(c) complete the curriculum in accordance with the regulations that follow.

Length of study

AS3 The curriculum shall normally extend over three academic years consisting of six semesters of full-time study, excluding the summer semesters. Candidates shall not in any case be permitted to complete the curriculum in more than four academic years, which being the maximum period of registration.

Completion of the curriculum

AS4 To complete the curriculum, candidates shall:

(a) satisfy the requirements prescribed in UG3 of the Regulations for First Degree Curricula[(2)];
(b) enrol in not less than 180 credits of courses, unless otherwise required or permitted under the Regulations;

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(1) This regulation should be read in conjunction with UG1 of the Regulations for First Degree Curricula.

(2) The specific requirements applicable to candidates of this degree curriculum are spelt out in the syllabuses.

(c) follow the required number of compulsory and elective courses as prescribed in the syllabuses of the equivalent of normally 60 credits for each year of study. For each semester, candidates shall select not less than 24 or more than 36 credits of courses, except for the last semester of study;
(d) take a maximum of 84 credits of introductory level courses and the rest being advanced level courses as prescribed in the syllabuses over the entire period of studies; and
(e) take not less than 84 credits of advanced level courses from the Department of Statistics and Actuarial Science.

Selection of courses

AS5 Candidates who wish to withdraw from a course at the beginning of each semester may do so up to 2 weeks after the commencement of the semester. Withdrawal beyond the 2-week deadline will not be permitted, except for medical or other reasons acceptable by the Faculty Board, and candidates' withdrawal from any course without permission will be given a failed grade.

Assessment and grades

AS6 Candidates should be assessed for each of the courses which they have registered. The assessment may take one or a combination of forms as prescribed in the syllabuses and shall normally include the candidates' coursework during the semester. Only those satisfactorily completed courses will earn credits.

AS7 Candidates' performance in a course shall be assessed with the grading system as prescribed in UG5 of the Regulations for First Degree Curricula.

Failure in examination

AS8 Candidates who fail in any course may, as directed by the Board of Examiners, be permitted to present themselves for re-assessment with or without repeating the failed course. The timing and the form(s) of re-assessment shall be decided by the Board of Examiners. Candidates shall not be allowed to repeat a course for which they have achieved a passed grade for upgrading purposes, nor shall they be permitted to repeat a course more than once. The failed grade will be recorded in the official transcripts. The new grade obtained after re-assessment of the same failed course will also be recorded and will replace the previous F grade in the calculation of the weighted grade point averages. As failed courses shall not be credited towards a degree, failed compulsory courses must be re-assessed.

Absence from examination

AS9 Candidates who are unable because of their illness to be present for any written examinations may apply for permission to present themselves for a supplementary examination to be held before the beginning of the first semester of the following academic year. Any such application shall be made on the form prescribed within two weeks of the first day of absence from any examination. Candidates who fail to satisfy the examiners in one or more papers in such a supplementary examination shall be considered under the provisions made in these Regulations for failure at the first attempt at the examination, except that a further supplementary examination shall not be permitted.

Performance assessment

AS10 At the end of each semester, candidates' performance shall be assessed for the purposes of determining

(a) their eligibility for progression to an award of the degree;
(b) their eligibility for the award; or
(c) whether they be required to be discontinued from the programme.

Progression of studies

AS11 Candidates shall be permitted to progress if they have:

(a) not exceeded the maximum period of registration; and
(b) accumulated not less than 30 credits and attained a GPA of 1.00 or above over the first and second semesters; or
(c) accumulated not less than 30 credits and attained a GPA of 1.50 or above over the third and fourth semesters; or
(d) accumulated not less than 30 credits and attained a GPA of 1.50 or above over the fifth and sixth semesters; or
(e) attained a semester GPA of 1.50 or above at the end of each subsequent semester.

Those who have not been able to fulfill the requirements above shall be recommended for discontinuation from the programme under General Regulation G12.

Award of the degree

AS12 To be eligible for the award of the degree of BSc(ActuarSc), candidates shall have:

(a) achieved a weighted GPA of 1.00 or above;
(b) successfully accumulated a minimum of 180 credits; and
(c) satisfied the requirements in UG3 of the Regulations for First Degree Curricula.

Degree classification

AS13 A list shall be published of candidates successful in the examinations for each semester. A list of candidates who have successfully completed all the degree requirements shall be published in five divisions: First Class Honours, Second Class Honours Division One, Second Class Honours Division Two, Third Class Honours, Pass. The classification of honours shall be determined by the Board of the Faculty at its full discretion by taking the overall performance of candidates and other relevant factors into consideration.

Special arrangements for students who take on 6-month full time internships (Subject to departmental approval, the same arrangements will apply to those who take on internships of a similar nature.)

In order to let final year students who take on 6-month full time internship to finish their degree with only one more semester of study, the department makes the following special arrangement:

1. Students who take on at least 6 months internships can take STAT2813 to earn 6 credits which can be used to replace any core course.
2. Such students can take STAT3806 and STAT3807 as reading courses if these courses are not available after they come back from internships and before they complete their degree. For the reading courses, the assessment will be based on 80% written report and 20% oral presentation.

3. Such students need not follow the regular programme if some courses are not available for them. However, departmental approval will be required for these students to take any other courses outside the regular programme.

SYLLABUSES FOR THE DEGREE OF BACHELOR OF SCIENCE IN ACTUARIAL SCIENCE

These syllabuses apply to students admitted in the academic year 2007-2008 or thereafter.

GENERAL FEATURES

1. Curriculum requirements

Regulations AS1 to AS4 specify the requirements with which candidates have to comply for completion of the BSc(ActuarSc) degree programme. For the fulfillment of Regulation UG3 "Requirements for Graduation", candidates shall complete successfully the language studies courses and the broadening courses as listed below. Furthermore they should obtain a pass in an Information Technology proficiency test, or successfully complete a 3-credit course in Information Technology.

2. Course registration

Course registration will take place before the commencement of each semester. All introductory level courses should be taken in the first or second semester except those specified in the syllabuses. In course registration, candidates should pay special attention to the pre-requisite and co-requisite requirements of courses as specified in the syllabuses. A prerequisite is a course which candidates must have completed in accordance with the conditions stipulated by the Dean via the Head of Department before being permitted to take a course in question. A co-requisite is a course which candidates must take at the same time as the course in question.

3. Coursework and examination ratio

Each 6-credit course with the prefix STAT leads to one written examination paper which will be two hours in length, unless otherwise specified. The final grading will be determined by performance in the examination and assessment of coursework in the ratio of 75:25, unless otherwise stated. For courses with other prefixes, please check with the respective departments about the duration of examination and assessment ratio:

Candidates shall take 60 credits of courses in Year I comprising:

STAT1801.	Probability and statistics: Foundations of actuarial science	(6 credits)
STAT1802.	Financial mathematics	(6 credits)
BUSI1002.	Introduction to accounting	(6 credits)
CSIS1117.	Computer programming I	(6 credits)
MATH1813.	Mathematical methods for actuarial science	(6 credits)
ECON1001.	Introduction to Economics I	(6 credits)
ECON1002.	Introduction to Economics II	(6 credits)
Any 6-credit introductory course		(6 credits)
CSCI0001.	Practical Chinese language course for science students	(3 credits)
ECEN1801.	Academic English for science students	(3 credits)
6 credits of any broadening courses		(6 credits)

Candidates shall take 60 credits of courses in Year II comprising:

STAT2801.	Life contingencies	(6 credits)
STAT2802.	Statistical models	(6 credits)
STAT2803.	Stochastic models	(6 credits)
STAT2804.	Linear models and forecasting	(6 credits)
STAT2808.	Derivatives markets	(6 credits)
STAT3801.	Advanced life contingencies	(6 credits)
STAT3810.	Risk theory	(6 credits)
6 credits of courses selected from List B		(6 credits)
ECEN2802.	Advanced English for science students	(3 credits)
Broadening courses:		
Humanities and Social Sciences studies		(3 credits)
Culture and Value Studies *or* any inter-faculty electives course outside BSc(ActuarSc) syllabus		(3 credits)
At least 3 credits of any other broadening course		(3 credits)

Candidates shall take 60 credits of courses in Year III comprising:

STAT2805.	Credibility theory and loss distributions	(6 credits)
STAT2806.	Financial economics	(6 credits)
STAT3806.	Investment and asset management	(6 credits)
STAT3811.	Survival analysis	(6 credits)
STAT3812.	Stochastic calculus with financial applications	(6 credits)
STAT3305.	Financial data analysis	(6 credits)
12 credits of courses selected from List C		(12 credits)
6 credits of courses selected from List B		(6 credits)
6 credits of inter/intra Faculty courses (advanced level)		(6 credits)

List B:

BUSI0019.	Intermediate accounting I
BUSI0020.	Intermediate accounting II
ECON2101.	Microeconomic theory
ECON2102.	Macroeconomic theory
ECON2113.	Microeconomic analysis
ECON2114.	Macroeconomic analysis
FINA0102.	Financial markets and institutions
FINA0302.	Theories of corporate finance
MATH2303.	Matrix theory and its applications
MATH2601.	Numerical analysis
STAT2807.	Corporate finance for actuarial science

Any other course approved by the Department of Statistics and Actuarial Science

List C:

STAT2302.	Statistical inference
STAT2306.	Business logistics
STAT2312.	Data mining
STAT3302.	Multivariate data analysis
STAT3304.	Computer-aided statistical modelling
STAT3306.	Selected topics in statistics
STAT3316.	Advanced probability
STAT3802.	Advanced contingencies
STAT3807.	Fundamentals of actuarial practice
STAT3809.	Current topics in actuarial science
STAT3819.	Project in statistics and actuarial science

Any other course approved by the Department of Statistics and Actuarial Science

BUSI1002. Introduction to accounting (6 credits)

The course will cover the principles of double entry book-keeping, the interpretation of financial statements, the issues raised by corporate regulation, and the use of management information for decision making.

BUSI0019. Intermediate accounting I (6 credits)

The course provides an in-depth knowledge of the first part of financial accounting. It covers the environment of financial accounting and the development of accounting standards; conceptual framework underlying financial accounting; statement of income and retained earnings; balance sheet; accounting and the time value of money; cash and receivables; valuation of inventories; acquisition and disposition of property, plant and equipment; depreciation and depletion; intangible assets; current liabilities and contingencies; long-term liabilities; temporary investments and long-term investments; and revenue recognition.

BUSI0020. Intermediate accounting II (6 credits)

This course provides an in-depth knowledge of the second part of financial accounting. It covers stockholders' equity; dilutive securities and earnings per share calculations; accounting for income taxes; accounting for pensions and postretirement benefits; accounting for leases; accounting changes and error analysis; statements of cash flows; basic financial statement analysis; and full disclosure in financial reporting.

CSCI0001. Practical Chinese language course for science students (3 credits)

(1) Practical Chinese Writing Skills
    (a) Classical and modern Chinese
    (b) The Chinese language: characteristics and usage
    (c) Basic grammar of modern Chinese
(2) Chinese Characters
    (a) Traditional characters
    (b) Simplified characters
    (c) Variant forms
(3) Letter-writing
    (a) Business letter writing techniques
    (b) Official letter writing techniques
(4) Office Documents
    (a) Notices and announcements
    (b) Proposals
    (c) Minutes and reports of meetings
(5) Chinese for Special Purposes
    (a) An introduction to science and technology in ancient China
    (b) Reader-based scientific/technical writings
    (c) Styles and rhetoric of scientific/technical writings
(6) Presentation and Communication Techniques
    (a) Communication and presentation techniques
    (b) Discussion and the art of persuasion

CSIS1117. Computer programming I (6 credits)

The goal of this course is for students to learn the general principles of programming, including how to design, implement, document, test, and debug programs. Assessment: 50% coursework; 50% examination.

ECEN1801. Academic English for science students (3 credits)

To build confidence in the use of English for writing and speaking about science. The focus is on:

(1) Writing an essay which meets the requirements of good academic writing, in particular making appropriate use of published sources and avoiding plagiarism.
(2) Speaking in an organized and coherent manner.

ECEN2802. Advanced English for science students (3 credits)

To develop a sense of audience awareness in writing, to develop spontaneous speaking skills and to individualise language learning. The focus is on:

(1) Writing a short article for one of a range of web journals each with a different audience and topic focus (individual choice).
(2) Spontaneous (i.e. unrehearsed) discussion through participation in speaking workshops and one-to-one discussions.
(3) Developing independent language learning skills to help students address their individual language problems and focus on their future language needs.

ECON1001. Introduction to Economics I (6 credits)

An introduction to the basic concepts and principles of microeconomics – the study of demand and supply, consumer theory, cost and production, market structure, and resource allocation efficiency.

ECON1002. Introduction to Economics II (6 credists)

This course is an introduction to macroeconomics – the study of business cycle fluctuations and long run economic growth. Topics include the measurement of national economic performance; the problems of recession, unemployment, and inflation; money supply, government spending, and taxation; fiscal and monetary policies for full employment and price stability; the determination of the exchange rate; and international trade and payments.

ECON2101. Microeconomic theory (6 credits)

The laws of demand, supply, returns, and costs; price and output determination in different market situations; theory of factor pricing and income distribution; general equilibrium; interest and capital.

ECON2102. Macroeconomic theory (6 credits)

Theories of income, employment, and the price level; analysis of secular growth and business fluctuations; introduction to monetary and fiscal policy.

ECON2113. Microeconomic analysis (6 credits)

Examine microeconomic issues with applications. Topics include: consumer behaviour, cost structure, market structure, theory of the firm, factor market and general equilibrium.

ECON2114. Macroeconomic analysis (6 credits)

Economics of inflation, unemployment, income and output determination in the short run and the long run. Money, interest rates and exchange rates. Macroeconomic stabilization policies and open economy macroeconomic issues.

FINA0102. Financial markets and institutions (6 credits)

This course is designed to introduce and analyze the structure, operations and functions of the financial system. The course starts with an introduction to financial markets' role in the economy, and the determination of interest rates and valuation of cash flows. The course then discusses various financial markets including money markets, bond markets, mortgage markets, stock markets and derivatives markets. Financial institutions will be discussed with an emphasis on their major functions and operations.

FINA0302. Theories of corporate finance (6 credits)

A course on the advanced treatment of corporate financial decisions. Topics to be covered include corporate valuation; cost of capital; capital structure; leasing; mergers and acquisitions; options; warrants; and convertible bonds.

MATH1813. Mathematical methods for actuarial science (6 credits)

To provide students with a background of calculus of several variables and matrix algebra and an introduction to ordinary differential equations that can be applied in actuarial science. Contents include: Matrices, systems of linear equations, determinants; Eigenvalues and eigenvectors, diagonalization of matrices; Quadratic functions and their standard forms; Functions of several variables; partial differentiation; directional derivatives; Taylor approximations; Maxima and minima; Lagrangian multipliers; Double and triple integrals; Simple differential equations.

MATH2303. Matrix theory and its applications (6 credits)

Matrix theory has a close connection with other mathematical subjects such as linear algebra, functional analysis, and combinatorics. It also plays an important role in the development of many subjects in science, engineering, and social sciences. In this course, students will be taught the fundamentals of matrix analysis and its application to various kinds of practical problems. Mathematical software will be used in the course, so that students can learn how to use the computer to solve matrix problems.

MATH2601. Numerical analysis (6 credits)

This course covers both the theoretical and practical aspects of Numerical Analysis. Emphasis will be on basic principles and practical methods of solution, using high speed computers.

STAT1801. Probability and statistics: foundations of actuarial science (6 credits)

This course provides the basic foundations in probability and statistics for students in B.Sc.(ActuarSc), though the course is also suitable for mathematically-able students from other quantitative curricula. Probability theory underpins the study of statistics. The course aims firstly to develop skills in probabilistic analysis for problems involving randomness. Random variables and probability distributions are studied in depth, such as discrete and continuous distributions, conditional probability, conditional expectation, central limit theorem. The concepts of statistics are then introduced, guided by motivating examples.

STAT1802. Financial mathematics (6 credits)

This course introduces the mathematics of finance which plays an important role in the development of basic actuarial techniques. Introduction to risk management and practical applications of the actuarial functions are also covered. Key topics include: measurement of interest, annuities certain; discounted cash flow analysis; yield rates; amortization schedules and sinking funds; bonds and related securities; practical applications such as real estate mortgage, short sales and modern financial instruments; stochastic approaches to interest; financial derivatives including forwards, futures, options and swaps; insurance, collars and other strategies; introduction to risk management.

STAT2302. Statistical inference (6 credits)

This course covers the advanced theory of point estimation, interval estimation and hypothesis testing. Using a mathematically-oriented approach, the course provides a solid and rigorous treatment of inferential problems, statistical methodologies and the underlying concepts and theory. It is suitable in particular for students intending to further their studies or to develop a career in statistical research. Contents include: (1) Decision theory: loss function; risk; decision rule; admissibility; minimaxity; unbiasedness; Bayes' rule; (2) Estimation theory: group families; exponential families; likelihood; sufficiency; minimal sufficiency; ancillarity; completeness; UMVU estimators; information inequality; large-sample theory of maximum likelihood estimation; (3) Hypothesis testing: uniformly most powerful test; monotone likelihood ratio; unbiasedness; UMP unbiased test; maximal invariants; most powerful invariant test; large-sample theory of likelihood ratio; Wald's test; score test.

STAT2306. Business logistics (6 credits)

Originally, the word 'logistics' described the strategic aspects involved in moving and supplying armies and navies. Usage grew to include games of strategy, such as chess. Modern business corporations are increasingly using logistics as a management tool, for example, in capital budgeting problems, production planning, scheduling, transportation or in deciding a location for a new factory. This course addresses the business applications of logistics. Contents include: optimization techniques applied to problems in the allocation of resources, financial planning and transportation; linear programming, dynamic programming, integer programming; network analysis, critical path methods; queuing theory; probability modelling tools in production and inventory control.

STAT2312. Data mining (6 credits)

With an explosion in information technology in the past decade, vast amounts of data appear in a variety of fields such as finance, marketing research, customer relations management, medicine and healthcare. The challenge of understanding these data with the aim of creating new knowledge and finding new relationships among data attributes has led to the innovative usage of statistical methodologies and

development of new ones. In this process, a new area called data mining is spawned. This course provides a comprehensive and practical coverage of essential data mining concepts and statistical models for data mining. Contents include: data pre-processing, association rules, classification and regression trees, neural networks, and cluster analysis.

STAT2801. Life contingencies (6 credits)

The major objectives of this course are to integrate life contingencies into a full probabilistic framework and to demonstrate the wide variety of constructs which are then possible to build from basic models at the foundation of actuarial science. The time-until-death random variable will be the basic building block by which models for life insurances, designed to reduce the financial impact of the random event of untimely death, will be developed. Techniques for calculation benefit premiums and benefit reserves of various types of life annuity and insurance will be discussed.

STAT2802. Statistical models (6 credits)

This course builds on STAT1801, introducing further the concepts and methods of statistics. Through the disciplines of statistical modelling, inference and decision making, students will be equipped with both quantitative skills and qualitative perceptions essential for making rigorous statistical analysis of real-life data. Contents include: Random Variables and Probability Distributions; Function of Random Variables; Sampling Distributions; Limiting Distributions; Estimation Theory; Confidence Intervals; Analysis of variance and application; Hypothesis Testing; Goodness of Fit Test.

STAT2803. Stochastic models (6 credits)

This is an introductory course in probability modelling. A range of important topics in stochastic processes will be discussed. Main topics include: introduction to probability theory, Conditional probability and expectation, Markov chains, random walk models, Poisson process, Brownian Motion. Birth-and-death process, branching process and renewal process may also be covered (if time permits).

STAT2804. Linear models and forecasting (6 credits)

This course deals with applied statistical methods of linear models and investigates various forecasting procedures through time series analysis. Contents include: regression and multiple linear regression; predicting; generalised linear model; time series models including autoregressive, moving average, autoregressive-moving average and integrated models; forecasting.

STAT2805. Credibility theory and loss distributions (6 credits)

Credibility is an example of a statistical estimate. The idea of credibility is very useful in premium calculation. Insurance loss varies according to the business nature, what distribution should be used to fit a particular loss is both of theoretical interest and practical importance. This course covers important actuarial and statistical methods. Topics on credibility include: Limited fluctuation approach, Bühlmann's approach, Bayesian approach, and their applications. Topics on loss distribution will be: Some often used distributions for loss and properties, truncation and modification, compound distributions, and mixed models. At the end of the course, we will cover some topics which are used in the option pricing theory, such as lognormal distribution, estimating the parameters of a lognormal distribution, Monte Carlo method and applications to option valuation.

STAT2806. Financial economics (6 credits)

This course covers the skills necessary to construct and apply discrete stochastic models to value financial derivatives. Contents include: introduction to financial market, probability space, random variable, conditional expectation, discrete time stochastic process and martingales, discrete time asset pricing models and valuation of derivative securities. Basic ideas of asset and liability management, interest rate risk and immunization.

STAT2807. Corporate finance for actuarial science (6 credits)

This course is designed for actuarial science students to receive VEE-Corporate Finance from Society of Actuaries. The objective of this course is to introduce students to the fundamental principles of corporate finance. The course will provide students with a systematic framework within which to evaluate investment and financing decisions for corporations. The first part of the course will give an introduction to corporate finance and provide an overview of some topics covered in STAT1802 and STAT2315. These include: financial markets and companies; present value and net present value, financial instruments and dividends derivatives market, no-arbitrage pricing theory, binomial model and Black-Scholes option pricing formula. The main part of the course will focus on some important topics of corporate finance including: capital structure and dividend policy, financial leverage and firm value, market efficiency, risk and return, investment decision using Markowitz mean variance analysis, CAPM, long term financing, measures and performance assessment of financial performance using various measures.

STAT2808. Derivatives markets (6 credits)

This course aims at demonstrating the practical use of financial derivative products to analyse various problems arisen in financial engineering. Emphases are on the various option pricing formulae, hedging techniques and interest rate models. Contents include: Review of futures, forwards and options and the concept of no arbitrage; put-call parity; valuation of European and American options using the binomial model; valuation of European and American options using the Black-Scholes option pricing model; the Greeks: their calculation and interpretation; implied volatility; delta hedging and the role of market-makers; exotic options: Asian options, barrier options, compound options, gap options and exchange options; diffusion process and Ito's formula; interest rate models: bond options, caps and the Black model, market making and bond pricing, the Vasicek and Cox-Ingersoll-Ross bond price models, the binomial interest rate model and the Black-Derman-Toy model.

STAT2813. Internship in actuarial science (6 credits)

This course is offered to actuarial science students who take on an 6-month full time or similar internships. A student can complete this course as a project based on his/her internship. The report should emphasize important working/educational experiences encountered by the student during his/her internship. In many situations, this would mean a report of the project(s) that the student has been involved in his/her internship.

STAT3302. Multivariate data analysis (6 credits)

In many designed experiments or observational studies the researchers are dealing with multivariate data, where each observation is a set of measurements taken on the same individual. These measurements are often correlated. The correlation prevents the use of univariate statistics to draw inferences. This course develops the statistical methods for analysing multivariate data through

examples in various fields of application and hands-on experience with the statistical software SAS. Contents include: Problems with multivariate data. Multivariate normality and transforms. Correlations: Simple, partial, multiple and canonical. Principal components analysis. Factor analysis. Mean structure for one sample. Problems for means of several samples. Multivariate analysis of variance. Discriminant analysis. Classification. Multivariate multiple regression. Clustering algorithms.

STAT3304. Computer-aided statistical modelling (6 credits)

This is a computer-aided course of statistical modelling designed for the students who have taken STAT2301 Linear Statistical Analysis and like to see theory illustrated by practical computation. Numerous real data sets will be presented for modelling and analysis using statistical software, such as SAS, for gaining hands-on experience. The course also aims to develop skills of model selection and hypotheses formulation for testing, so that questions of interest can be properly formulated and answered. An important element deals with model review and improvement, when one's first attempt does not adequately fit the data. Modern computer software such as SAS makes this interactive approach easier.

STAT3305. Financial data analysis (6 credits)

This course focuses on understanding financial data and methods by which they are analyzed and interpreted. It aims at enhancing the students' analytical skills of developing statistical models for analysing financial data. Techniques are motivated by examples and developed in the context of applications. Students will learn how to process financial data for purposes of financial analysis, estimation and testing of financial models and to understand better crucial aspects of financial market movements. Contents include: modelling non-normal return; financial time series models including ARCH models and generalisation, and threshold models; forecasting volatility and correlation; Monte Carlo Simulation and option pricing; Estimation of value at risk and expected tail loss; becktesting and stress testing.

STAT3306. Selected topics in statistics (6 credits)

This course introduces basic statistical concepts and methods which potential graduate students will find useful in preparing for work on a research degree in statistics. Focus is on applications of state-of-the-art statistical techniques and their underlying theory.

STAT3307. Project in statistics (6 credits)

Each year a few projects suitable for Statistics or Actuarial Science major students will be offered. These projects, under the supervision of individual staff members involve the application of statistics and/or probability in interesting situations. They provide students with practical experience in approaching a real problem, in report writing and in oral presentation.

STAT3316. Advanced probability (6 credits)

This course provides an introduction to measure theory and probability. The course will focus on some basic concepts in probability which are essential for students to read research papers in actuarial science, probability and statistics. Contents include: Kolmogorov-Borel probability spaces, σ-field, measurability, random variable, integration, theory of expectation, probabilistic inequalities, L^p - and Hilbert spaces, conditional expectations, limit theorems, martingales and applications.

STAT3801. Advanced life contingencies (6 credits)

This course builds on the material covered in STAT2801. Several extensions of the basic theory of life contingencies and insurance models are discussed. The analysis of financial benefits contingent on the time of death of a single life can be extended to benefits involving several lives. The multiple decrement models, instead of a single contingency of death, are studied. Applications of these advanced theories are given. Contents include: select and ultimate tables; multiple life functions; multiple decrement models; valuation for pension plans; nonforfeiture benefits and dividends including surrender values and paid-up insurance; gross premiums; gross premium reserves; alterations to life insurance policies.

STAT3802. Advanced contingencies (6 credits)

This course serves as a continuation of STAT3801 and extends the coverage of statistical models and actuarial techniques used in the field of life insurance. Topic covers further analysis of the multiple decrement model; multiple state model; disability contracts; long-term care contracts; unit-linked contracts; with profit policies; emerging costs methods; profit testing; asset shares; cost of guarantees and options; applications of actuarial techniques to a wide range of insurance problems.

STAT3806. Investment and asset management (6 credits)

This course provides basic analysis of various investment instruments and asset management techniques. Emphasis will be placed on methods to tackle problems faced by insurance industry such as interest rate fluctuations. This course covers the following topics: introduction to financial markets, the structure of interest rates, cash-flow matching methods and immunization models.

STAT3807. Fundamentals of actuarial practice (6 credits)

This course covers basic principles of design, risk classification, pricing/ratemaking/funding, profit/surplus analysis, and valuation of financial security programmes including life, health, retirement plans, and property casualty insurance.

STAT3809. Current topics in actuarial science (6 credits)

This course covers a range of topics related to professional actuarial work which may include topics from regulatory requirements, law, life, health, financial planning, property and casualty and reinsurance.

STAT3810. Risk theory (6 credits)

Risk theory is one of the main topics in actuarial science. Risk theory is the applications of statistical models and stochastic processes to insurance problems such as the premium calculation, policy modifications, ruin probability, etc.
The general scope of the course content is as follows: Preliminaries; individual risk models; collective risk models; ruin theory; concepts of decision theory and application; fundamental concepts of rating and application to simple experience rating systems; techniques for analyzing a delay (or run-off) triangle and projecting the ultimate position.

STAT3811. Survival analysis (6 credits)

This course is concerned with how models which predict the survival pattern of humans or other entities are established. This exercise is sometimes referred to as survival-model construction. This course covers: the nature and properties of survival models, including both parametric and tabular models. Topics will be selected from: methods of estimating tabular models from both complete and incomplete data samples, including the actuarial, moment, and maximum likelihood estimation techniques; methods of estimation parametric models from both complete and incomplete data samples, including parametric and semi-parametric models with concomitant variables; evaluation of estimators from sample data; Kaplan-Meier estimator; valuation schedule exposure formulas; practical issues in survival model estimation; statistical models including binomial and Poisson models; practical methods of estimating age specific single decrement rates; analysis of age and duration; practical considerations in life-office data collection, monitoring actual experience against that expected.

STAT3812. Stochastic calculus with financial applications (6 credits)

Stochastic calculus has become an essential tool in economics, insurance, finance and econometrics. This mathematical theory is the basis for pricing financial derivatives such as options and futures. This course is designed for students to develop professional skills in stochastic calculus and its applications to actuarial science and finance. Pure mathematical components of the course will be kept at a reasonably low level. The course begins with an overview of the basic concepts from probability theory. Stochastic processes, especially Brownian motion and martingales will be discussed. The main topics of the course include: Ito's stochastic integral, Ito's formula and stochastic differential equations. After developing the theory of stochastic calculus, Black-Scholes option pricing formula will be derived. Interest rate models, such as, Vasicek and Cox-Ingersoll-Ross models will be studied.

STAT3819. Project in statistics and actuarial science (6 credits)

Each year a few projects suitable for Actuarial Science students will be offered. These projects, under the supervision of individual staff members involve the application of statistics and/or probability in interesting situations. They provide students with practical experience in approaching a real problem, in report writing and in oral presentation.