

Actuarial studies

Ordinary degree first year

300-101 Introduction to Actuarial Studies

Note: Students who have completed a level-2 actuarial studies subject will not normally be permitted to enrol in this subject.

Credit points: 12.5

HECS-band: 2

Coordinator: R.M. Fitzherbert

Prerequisites: 620-121 Mathematics A (Advanced) or 620-141 Mathematics A.

Contact: Two 1-hour lectures and a 1-hour tutorial per week (*Semester 2*).

Description: This subject is an introduction to compound interest functions and operations; valuation of annuities, bonds and loans; demography, and factors affecting population growth and size; construction and use of the life table; applications of these in life insurance; types of insurance products; the role of the actuary; and the significance of financial institutions utilising actuarial management.

Assessment: A 2-hour end-of-semester examination (70%) and three assignments totalling not more than 4500 words (30%).

Second year

In addition to satisfying the individual subject prerequisites, students must have completed or gained credit for at least 75 level-1 points before they will be permitted to enrol in any of the level-2 (second year) subjects listed below.

300-203 Financial Mathematics I

Credit points: 12.5

HECS-band: 2

Coordinator: R.M. Fitzherbert

Prerequisites: 620-121 Mathematics A (Advanced) or 620-141 Mathematics A.

Contact: Two 1-hour lectures and a 1-hour tutorial per week (*Semester 1*).

Description: Topics include compound interest functions; valuation of a series of payments, including where the cash flows and/or the force of interest are continuous functions of time; equations of value; loans repayable by instalments; characteristics of major asset types; and discount valuation of fixed interest securities, ordinary shares and property, including effects of tax.

Assessment: A 2-hour end-of-semester examination (70%) and three assignments totalling not more than 4500 words (30%).

300-204 Financial Mathematics II

Credit points: 12.5

HECS-band: 2

Coordinator: To be advised

Prerequisites: 300-203 Financial Mathematics I and 620-201 Probability

Contact: Two 1-hour lectures and a 1-hour tutorial per week (*Semester 2*).

Description: Topics include discount valuation of index-linked bonds and forward contracts; term structure of interest rates; duration and convexity; discounted cash flow techniques; distributions of accumulations and present values; stochastic simulation; time series models.

Assessment: A 2-hour end-of-semester examination (70%) and three assignments totalling not more than 4500 words (30%).

300-205 Introduction to Actuarial Practice

Credit points: 12.5

HECS-band: 2

Coordinator: To be advised

Prerequisites: 620-201 Probability and 300-203 Financial Mathematics I

Contact: Three hours of lectures and/or tutorials per week (*Semester 2*).

Description: This subject will develop the student's knowledge of basic actuarial principles applicable to a range of actuarial practice areas. The focus will be mainly on actuarial issues within Australia, but there will also be international references.

Assessment: A 2-hour end-of-semester examination (60%) and up to three assignments totalling not more than 4000 words (40%).

Third year

In addition to satisfying the individual subject prerequisites, students must have completed or gained credit for at least 175 level-1 and level-2 points before they will be permitted to enrol in any of the level-3 (third year) subjects listed below.

300-330 Survival Models: Theory and Applications

Credit points: 25

HECS-band: 2

Coordinator: D C M Dickson

Prerequisites: 300-203 Financial Mathematics I and 620-202 Statistics

Contact: Six hours of lectures and tutorials per week (*Semester 1*).

Description: Topics include survival models concepts; estimation procedures for lifetime distributions; multiple state models; transition intensities; exact and census methods for estimating transition intensities based upon age and duration; graduation; goodness of fit and smoothness of graduated estimates versus crude estimates; traditional life insurance products; present values of annuities and assurances for single lives and their moments; net premiums; and net policy values.

Assessment: Two 2-hour end-of-semester examinations (80%) and three assignments totalling not more than 4500 words (20%).

300-331 Modelling in Insurance and Finance I

Note: Students may not gain credit for both 300-331 Modelling in Insurance and Finance I and 620-301 Stochastic Modelling.

Credit points: 12.5

HECS-band: 2

Coordinator: K. Borovkov

Prerequisites: 300-204 Financial Mathematics II, 620-202 Statistics, and 620-123 Applied Mathematics (Advanced) or 620-143 Applied Mathematics.

Contact: Three hours of lectures per week and up to 12 practice classes per semester (*Semester 1*).

Description: Topics include review of probability theory; Markov chains and their applications; random walks; Poisson process and applications; general jump Markov processes and applications; time series with applications (Wilkie model); and elements of simulation, including the basics of MCMC.

Assessment: A 3-hour end-of-semester examination (80%) and either a mid-semester test or up to 50 pages of assignments (20%).

300-332 Modelling in Insurance and Finance II

Note: Students may not gain credit for both 300-332 Modelling in Insurance and Finance I and 620-302 Chance and Option Pricing I.

Credit points: 12.5

HECS-band: 2

Coordinator: To be advised.

Prerequisites: 300-331 Modelling in Insurance and Finance I.

Contact: Three hours of lectures per week and up to 12 practice classes per semester (*Semester 2*).

Description: Topics include one-dimensional Brownian motion and geometric Brownian motion; Itô's formula; Brownian motion calculus and stochastic differential equations, multi-dimensional asset model; Vasicek model; Levy processes and their application; martingales in insurance; and Monte Carlo simulation in insurance and finance.

Assessment: A 3-hour end-of-semester examination (80%) and either a mid-semester test or up to 50 pages of assignments (20%).

300-334 Financial Mathematics III

Note: Students may not gain credit for both 300-334 Financial Mathematics III and either 306-331 Investments or 333-301 Investments.

Credit points: 12.5

HECS-band: 2

Coordinator: To be advised

Prerequisites: 300-204 Financial Mathematics II

Contact: Three hours of lectures and/or tutorials per week (*Semester 1*).

Description: This subject introduces actuarial students to stochastic asset liability modelling. It aims to expand the student's knowledge of basic actuarial principles in the fields of investments and asset management. Topics include: utility theory, stochastic dominance, measures of investment risk, portfolio theory, models of asset returns, asset liability modelling, equilibrium models, the efficient markets hypothesis, and stochastic models of security prices.

Assessment: A 2-hour end-of-semester examination (80%) and up to three assignments totalling not more than 4500 words (20%).

300-341 Actuarial Mathematics I

Credit points: 12.5

HECS-band: 2

Coordinator: E B McEllin

Prerequisites: 300-330 Survival Models: Theory and Applications.

Contact: Two 1-hour lectures and a 1-hour tutorial per week (*Semester 2*).

Description: Topics include impact of expenses; gross premiums and reserves for life insurance contracts; premiums and reserves for products including disability, long-term care and unit linked products; discounted emerging costs and profit tests; asset shares; and early termination of contracts.

Assessment: A 2-hour end-of-semester examination (80%) and up to three assignments totalling not more than 3000 words (20%).

300-342 Actuarial Mathematics II**Credit points:** 12.5**HECS-band:** 2**Coordinator:** H.-S. Lim**Prerequisites:** 300-330 Survival Models: Theory and Applications.**Contact:** Two 1-hour lectures and a 1-hour tutorial per week (*Semester 2*).**Description:** Topics include joint life functions; forms and causes of selection; population projections; risk classification; guarantees and options under life insurance contracts; and multiple decrement and service tables.**Assessment:** A 2-hour end-of-semester examination (80%) and up to three assignments totalling not more than 3000 words (20%).**Fourth-year honours**

The following subjects are available only to those admitted to the honours degree unless special approval is granted by the Professor of Actuarial Studies.

300-400 Actuarial Studies Research Essay**Note:** Students are normally required to enrol in this subject in Semester 2.**Credit points:** 25**HECS-band:** 2**Coordinator:** R M Fitzherbert**Prerequisites:** Entry into the fourth-year honours program in actuarial studies.**Semester:** Research**Description:** The research essay of at most 10 000 words will be on a topic approved by the Head of Department.**Assessment:** The research essay is examined. It must be submitted by the end of Semester 2.**300-406 Risk Theory I****Credit points:** 12.5**HECS-band:** 2**Coordinator:** H.-S. Lim**Prerequisites:** 300-332 Modelling in Insurance and Finance II.**Contact:** Three hours of lectures and/or tutorials per week (*Semester 1*).**Description:** Topics include collective risk model, calculation of moments and mgf of aggregate claims; recursion formulae (ie. Panjer's and Schröter's), effect of reinsurance; individual risk model, De Priol's recursion formula and Kornya's method; fundamentals of decision theory; credibility theory; exact credibility and the Bühlmann-Straub model; and no claims discount.**Assessment:** A 3-hour end-of-semester examination (100%).**300-407 Risk Theory II****Credit points:** 12.5**HECS-band:** 2**Coordinator:** D.C.M. Dickson**Prerequisites:** 300-406 Risk Theory I.**Contact:** Three hours of lectures and/or tutorials per week (*Semester 2*).**Description:** Topics include premium principles, including variance principle, Esscher principle, risk adjusted principle; applications of utility theory, premium calculation and optimal reinsurance retention levels; estimation of outstanding claims reserves; ruin theory, the adjustment coefficient and Lundberg's inequality, explicit solutions for the probability of ultimate ruin, application of Panjer's recursion formula, the probability and severity of ruin, the effect of reinsurance on the adjustment coefficient.**Assessment:** A 3-hour end-of-semester examination (100%).**300-408 Advanced Financial Mathematics****Credit points:** 12.5**HECS-band:** 2**Coordinator:** To be advised**Prerequisites:** 300-332 Modelling in Insurance and Finance II.**Contact:** Three hours of lectures and/or tutorials per week (*Semester 1*).**Description:** Topics include review of martingales, Itô's formula and SDEs; stochastic asset models; term structure models; valuation of derivative securities (European and American options, the Black-Scholes formula); numerical techniques; and actuarial applications (eg. maturity guarantees, SPDAs).**Assessment:** A 3-hour end-of-semester examination (100%).**300-410 Actuarial Practice and Control I****Credit points:** 12.5**HECS-band:** 2**Coordinator:** J.D. Gribble**Prerequisites:** 300-341 Actuarial Mathematics I.**Contact:** Four hours of lectures and/or tutorials per week (*Semester 1*).**Description:** Topics include insurance markets and products; underwriting and risk assessment; policy design; actuarial modelling; actuarial assumptions and feedback; reserving methods.**Assessment:** A 3-hour end-of-semester examination (70%) and assignments totalling not more than 4500 words (30%).**300-411 Actuarial Practice and Control II****Note:** It is recommended that students complete 300-410 before enrolling in this subject.**Credit points:** 12.5**HECS-band:** 2**Coordinator:** J.D. Gribble**Prerequisites:** 300-341 Actuarial Mathematics I.**Contact:** Four hours of lectures and/or tutorials per week (*Semester 2*).**Description:** Topics include investments for different types of liabilities; assessment of solvency; analysis of experience; analysis of surplus; actuarial techniques in the wider fields; and an introduction to professionalism.**Assessment:** A 3-hour end-of-semester examination (70%) and assignments totalling not more than 4500 words (30%).