ACTUARIAL SCIENCE (ACTS)

ACTS 399 Independent Study
Crosslisted with: ACTS 399H
Prerequisites: Permission.
Credit Hours: 1-3
Min credits per semester: 1
Max credits per semester: 3
Max credits per degree: 24
Format: IND

ACTS 399H Independent Study
Crosslisted with: ACTS 399
Credit Hours: 1-3
Min credits per semester: 1
Max credits per semester: 3
Max credits per degree: 24
Format: IND

ACTS 401 Problem Lab: Basic Actuarial Applications of Probability
Prerequisites: MATH 208/208H and STAT 462, or parallel, and both with a grade of "Pass" or "C" or better
Description: Calculus-based probability, both univariate and multivariate, applications to risk management-related problems. Problems as posed in the Society of Actuaries (SOA) Exam "P" and/or Casualty Actuarial Society (CAS) Exam "1". Determination of loss frequency distributions and their characteristics, expected value, variance, and percentiles. Determination of loss severity distributions and their characteristics, expected value, variance, and percentiles. Determination of loss sharing parameters, deductibles, and maximum payments.
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 1
Format: LAB

ACTS 402 Problem Lab: Basic Actuarial Applications of Financial Mathematics
Prerequisites: ACTS 440/840 or parallel
Description: Application of basic mathematics of finance to problems involving valuation of financial transactions. Problems as posed in the "Society of Actuaries (SOA) Exam 'FM'" and/or "Casualty Actuarial Society (CAS) Exam '2'". Determining equivalent measures of interest; estimating the rate of return on a fund; discounting or accumulating a sequence of payments with interest; determining yield rate; length of investment; amounts of investment contributions or amounts of investment returns for various types of financial transactions; and basic calculations involving yield curves, spot rates, forward rates, duration, convexity, immunization and short sales; introduction to financial derivatives (forwards, options, futures, and swaps) and their use in risk management; and introduction to the concept of no-arbitrage as a fundamental concept in financial mathematics.
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 1
Format: LAB

ACTS 403 Problem Lab: Actuarial Models - Life Contingencies
Prerequisites: ACTS 470/870, 471/871, and 473/873
Description: Problems as posed in the "Society of Actuaries (SOA) Exam 'M'" and/or "Casualty Actuarial Society (CAS) Exam '3'". Survival and severity models; "Markov Chain" models; life contingencies; and "Poisson" processes.
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 1
Format: LAB

ACTS 404 Problem Lab: Construction and Evaluation of Actuarial Models
Prerequisites: ACTS 410 and 425
Description: Problems as posed in the Society of Actuaries (SOA) Exam "C" and/or Casualty Actuarial Society (CAS) Exam "4". Construction of empirical models; construction and selection of parametric models; credibility theory; interpolation and smoothing of data; and simulation.
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 1
Format: LAB

ACTS 410 Introduction to Credibility, Smoothing of Data, and Simulation
Crosslisted with: ACTS 810
Prerequisites: STAT 463
Description: Full, partial, Buhlmann, and Buhlmann-Straub credibility models. Introduction to empirical Bayes and statistical distributions used to model loss experience. Application of "polynomial splines" to actuarial data. Simulation of "discrete" and "continuous random" variables in context of actuarial models. Simulation to "p-value" of hypothesis test. "Bootstrap method" of estimating the "mean squared error" of an estimator.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Prerequisite for: ACTS 404

ACTS 425 Survival Models
Crosslisted with: ACTS 825
Prerequisites: STAT 463 with a grade of "C" or better
Description: Parametric and tabular survival models. Estimation based on observations that might not be complete. Concomitant variables. Use of population data. Applications to groups with impaired lives.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Prerequisite for: ACTS 404
ACTS 430 Actuarial Applications of Applied Statistics
Crosslisted with: ACTS 830
Prerequisites: STAT 463 with a grade of "C" or better
Notes: Data sets processed and analyzed using statistical software.
Description: Introduction to forecasting in actuarial science. Simple and multiple regression, instrumental variables, time series methods, and applications of methods in forecasting actuarial variables. Interest rates, inflation rates, and claim frequencies.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

ACTS 440 Interest Theory
Crosslisted with: ACTS 440H, ACTS 840
Prerequisites: MATH 208/208H with a grade of "Pass" or "C" or better, or parallel
Description: Application of mathematical actuarial problems to problems involving valuation of financial transactions; equivalent measures of interest; rate of return on a fund; discounting or accumulating a sequence of payments with interest; and yield rates, length of investment, amounts of investment contributions or amounts of investment returns for various types of financial transactions; loans and bonds. Introduction to the mathematics of modern financial analysis. Calculations involving yield curves, spot rates, forward rates, duration, convexity, and immunization.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Format: LEC
Prerequisite for: ACTS 405; ECON 365, FINA 365, FINA 365H, ECON 365H; FINA 338, FINA 338H; FINA 363, FINA 363H; FINA 367; FINA 375, FINA 375H; FINA 382, FINA 382H; FINA 401; FINA 450; FINA 467

ACTS 440H Interest Theory
Crosslisted with: ACTS 440, ACTS 840
Prerequisites: MATH 208/208H with a grade of "Pass" or "C" or better, or parallel
Description: Application of financial mathematics to problems involving valuation of financial transactions; equivalent measures of interest; rate of return on a fund; discounting or accumulating a sequence of payments with interest; and yield rates, length of investment, amounts of investment contributions or amounts of investment returns for various types of financial transactions; loans and bonds. Introduction to the mathematics of modern financial analysis. Calculations involving yield curves, spot rates, forward rates, duration, convexity, and immunization.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Format: LEC
Prerequisite for: ACTS 405; ECON 365, FINA 365, FINA 365H, ECON 365H; FINA 338, FINA 338H; FINA 363, FINA 363H; FINA 367; FINA 375, FINA 375H; FINA 382, FINA 382H; FINA 401; FINA 450; FINA 467

ACTS 441 Introduction to Financial Economics
Crosslisted with: ACTS 841
Prerequisites: MATH 208 with grade of "C" or better or concurrent; ACTS 440
Description: Financial mathematics concepts related to short sales, forwards, options, futures, and swaps, and their use in risk management, hedging and investment strategies, fundamental concepts of put-call parity and no-arbitrage, and interest rate models.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

ACTS 442 Principles of Pension Valuation
Crosslisted with: ACTS 842
Prerequisites: ACTS 471/871 with a grade of "C" or better
Description: Actuarial cost methods. Determination of normal costs and accrued liability. Effect on valuation results due to changes in experience, assumptions and plan provisions. Valuation of ancillary benefits. Determination of actuarially equivalent benefits at early or postponed retirement and optional forms of payment.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

ACTS 450 Stochastic Processes for Actuaries
Crosslisted with: ACTS 850
Prerequisites: STAT 463 with a grade of "C" or better
Description: Introduction to stochastic processes and their applications in actuarial science. Discrete-time and continuous-time processes; Markov chains; the Poisson process; compound Poisson processes; non-homogeneous Poisson processes; arithmetic and geometric Brownian motions. Applications of these processes in computation of resident fees for continuing care retirement communities. Pricing of financial instruments.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

ACTS 470 Life Contingencies I
Crosslisted with: ACTS 870
Prerequisites: ACTS 440 and STAT 462, each with a grade of "C" or better
Description: Theory and applications of contingency mathematics in the areas of life and health insurance, annuities, and pensions. Probabilistic models. First course of a two-course sequence that includes ACTS 471.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Prerequisite for: ACTS 403

ACTS 471 Life Contingencies II
Crosslisted with: ACTS 871
Prerequisites: ACTS 470 and STAT 462, each with a grade of "C" or better
Description: Life insurance reserve for models based on a single life. Introduction to multiple life models for pensions and life insurance and to multiple decrement models.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Prerequisite for: ACTS 403
ACTS 473 Introduction to Risk Theory
Crosslisted with: ACTS 873
Prerequisites: STAT 462 with a grade of "C" or better
Description: Applications of compound distributions in modeling of insurance loss. Continuous-time compound Poisson surplus processes, computation of ruin probabilities, the distributions of the deficit at the time of ruin, and the maximal aggregate loss. The effect of reinsurance on the probability of ruin.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Prerequisite for: ACTS 403

ACTS 474 Introduction to Property/Casualty Actuarial Science
Crosslisted with: ACTS 874
Prerequisites: STAT 462 with a grade of "C" or better.
Description: Mathematical, financial, and risk-theoretical foundations of casualty actuarial science. Risk theory, loss reserving, ratemaking, risk classification, credibility theory, reinsurance, financial pricing of insurance, and other special issues and applications.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

ACTS 475 Actuarial Applications in Practice
Crosslisted with: ACTS 475H, ACTS 875
Prerequisites: ACTS 471/871; FINA 307/307H or 338
Description: Principles and practices of pricing and/or funding and valuation for life, health, property and liability insurance, and annuities and pension plans. Commercially available actuarial modeling software.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
ACE: ACE 10 Integrated Product

ACTS 475H Actuarial Applications in Practice
Crosslisted with: ACTS 475, ACTS 875
Prerequisites: ACTS 471/871; FINA 307/307H or 338
Description: Principles and practices of pricing and/or funding and valuation for life, health, property and liability insurance, and annuities and pension plans. Commercially available actuarial modeling software.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
ACE: ACE 10 Integrated Product

ACTS 498 Special Topics
Crosslisted with: ACTS 898, FINA 498, FINA 898
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 24
Format: LEC