

# ACTUARIAL SCIENCE (ACTS)

## ACTS 810 Introduction to Credibility, Smoothing of Data, and Simulation

**Crosslisted with:** ACTS 410

**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

**Grading Option:** Graded

**Prerequisite for:** ACTS 404

## ACTS 825 Survival Models

**Crosslisted with:** ACTS 425

**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

**Grading Option:** Graded

**Prerequisite for:** ACTS 404

## ACTS 830 Actuarial Applications of Applied Statistics

**Crosslisted with:** ACTS 430

**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

**Grading Option:** Graded

## ACTS 840 Interest Theory

**Crosslisted with:** ACTS 440

**Prerequisites:** MATH 208 or 208H with a grade of "Pass" or "C" or better, or parallel

**Notes:** Grade only

**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

**Grading Option:** Graded

**Prerequisite for:** ACTS 405; ECON 365, FINA 365; FINA 338; FINA 363; FINA 367; FINA 375; FINA 382; FINA 401; FINA 450; FINA 464

## ACTS 841 Introduction to Financial Economics

**Crosslisted with:** ACTS 441

**Prerequisites:** MATH 208 with grade of "C" or better or concurrent.

**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

**Grading Option:** Graded

## ACTS 842 Principles of Pension Valuation

**Crosslisted with:** ACTS 442

**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

**Grading Option:** Graded

## ACTS 850 Stochastic Processes for Actuaries

**Crosslisted with:** ACTS 450

**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

**Grading Option:** Graded

## ACTS 870 Life Contingencies I

**Crosslisted with:** ACTS 470

**Prerequisites:** ACTS 440 and STAT 462, each with a grade of "C" or better.

**Notes:** First course of a two-course sequence that includes ACTS 471.

**Description:** Theory and applications of contingency mathematics in the areas of life and health insurance, annuities, and pensions. Probabilistic models.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Grading Option:** Graded

**Prerequisite for:** ACTS 403

**ACTS 871 Life Contingencies II**

**Crosslisted with:** ACTS 471

**Prerequisites:** ACTS 470 and STAT 462, each with a grade of "C" or better.

**Notes:** Second course of a two-course sequence that includes ACTS 470.

**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

**Grading Option:** Graded

**Prerequisite for:** ACTS 403; ACTS 442, ACTS 842

**ACTS 873 Introduction to Risk Theory**

**Crosslisted with:** ACTS 473

**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

**Grading Option:** Graded

**Prerequisite for:** ACTS 403

**ACTS 874 Introduction to Property/Casualty Actuarial Science**

**Crosslisted with:** ACTS 474

**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

**Grading Option:** Graded

**ACTS 875 Actuarial Applications in Practice**

**Crosslisted with:** ACTS 475

**Prerequisites:** ACTS 470/870; FINA 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

**Grading Option:** Graded

**Offered:** FALL/SPR

**ACTS 930 Fundamentals of Pension Mathematics**

**Description:** Basic theory of pension mathematics. Funding methods, unit credit, entry age normal, aggregate cost, actuarial assumptions, tax deductible contributions, multi-employer pension plans, deposit administration dividend formulas, variable annuities, and ERISA.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Grading Option:** Graded

**ACTS 950 Seminar in Actuarial Science**

**Credit Hours:** 1-3

**Min credits per semester:** 1

**Max credits per semester:** 3

**Max credits per degree:** 3

**Grading Option:** Graded