

# Actuarial Science (AS)

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## Courses

### **AS 1501. Actuarial Probability and Statistics I. 3 Credit Hours.**

In this course, probability theory and its application to insurance and risk management problems are discussed. Among the topics to be covered: counting techniques, conditional probability, Bayes' Theorem, discrete random variables, specific discrete distributions such as Binomial, Poisson, Negative Binomial and Uniform, moment generating functions and functions of two random variables. NOTE: Students need to earn a grade of C or better in this course to be eligible to register for all other required courses in the Actuarial Science major. Prior to spring 2016, the course title was "Introduction to Actuarial Science."

**College Restrictions:** Must be enrolled in one of the following Colleges: Business & Mngmnt, Fox School.

**Repeatability:** This course may not be repeated for additional credits.

#### **Pre-requisites:**

MATH 1042|Minimum Grade of C-|May be taken concurrently  
OR MATH 1942|Minimum Grade of C-|May be taken concurrently  
OR MATH 2043 to 3080| Required Courses:1|Minimum Grade of C-|May be taken concurrently  
OR MATW Y|May not be taken concurrently.

### **AS 1901. Honors Introduction to Actuarial Science. 3 Credit Hours.**

Honors version of Actuarial Science 1501 (0001). NOTE: Students need to earn a grade of C or better in this course to be eligible to register for all other required courses in the Actuarial Science major.

**College Restrictions:** Must be enrolled in one of the following Colleges: Business & Mngmnt, Fox School.

**Cohort Restrictions:** Must be enrolled in one of the following Cohorts: SCHONORS, UHONORS, UHONORSTR.

**Course Attributes:** HO

**Repeatability:** This course may not be repeated for additional credits.

#### **Pre-requisites:**

MATH 1042|Minimum Grade of C-|May be taken concurrently  
OR MATH 1942|Minimum Grade of C-|May be taken concurrently  
OR MATH 2043 to 3080| Required Courses:1|Minimum Grade of C-|May be taken concurrently  
OR MATW Y|May not be taken concurrently.

### **AS 2101. Actuarial Probability and Statistics II. 3 Credit Hours.**

In this course, probability theory and its application to insurance and risk management problems are discussed in the context of continuous random variables. Among the topics to be covered are: Random variables, probabilities, and percentiles on a continuum; specific continuous distributions such as Uniform, Gamma and Exponential, Normal, and Beta; moments and moment generating functions; conditional and marginal distributions; transformations of one or two random variables; order statistics; and the Central Limit Theorem.

**College Restrictions:** Must be enrolled in one of the following Colleges: Business & Mngmnt, Fox School.

**Repeatability:** This course may not be repeated for additional credits.

#### **Pre-requisites:**

(MATH 2043|Minimum Grade of C|May not be taken concurrently  
OR MA08 Y|May not be taken concurrently)  
AND (AS 1501|Minimum Grade of C|May not be taken concurrently  
OR AS 1901|Minimum Grade of C|May not be taken concurrently)

**AS 2502. Theory of Interest. 3 Credit Hours.**

In this course, simple, compound and effective interest functions are analyzed and used in the calculation of present value and future values of various investments. Annuities, loan amortization and bonds are discussed and techniques for computing their values at various dates are explored. NOTE: Students will need to earn a minimum grade of C in this course to be eligible to take Actuarial Science 3501.

**College Restrictions:** Must be enrolled in one of the following Colleges: Business & Mngmnt, Fox School.

**Repeatability:** This course may not be repeated for additional credits.

**Pre-requisites:**

MATH 1042|Minimum Grade of C|May not be taken concurrently  
OR MATH 1942|Minimum Grade of C|May not be taken concurrently  
OR MATH 2043|Minimum Grade of C-|May be taken concurrently  
OR MA07 Y|May not be taken concurrently  
OR MATW Y|May not be taken concurrently.

**AS 2503. Corporate Finance for Actuarial Science. 3 Credit Hours.**

This course develops the conceptual framework of corporate finance and financial derivative from an actuarial perspective. It prepares students for the Derivatives Markets material on Exam FM/2 and also offers VEE credit for Corporate Finance. Topics covered in this course include financial statements, asset valuation, capital budgeting, capital structure, the cost of capital and dividend policy. Financial derivatives, such as forwards, futures, swaps, and options, will be discussed in detail and their application in corporate risk management will be examined. NOTE: This course should be taken in place of Finance 3101 and has been approved by the Society of Actuaries/Casualty Actuarial Society for VEE - Corporate Finance. Completion of this course with a minimum grade of B- is required for VEE - Corporate Finance credit.

**College Restrictions:** Must be enrolled in one of the following Colleges: Business & Mngmnt, Fox School.

**Repeatability:** This course may not be repeated for additional credits.

**Pre-requisites:**

(MATH 1042|Minimum Grade of C|May not be taken concurrently  
OR MATH 1942|Minimum Grade of C|May not be taken concurrently  
OR MATH 2043|Minimum Grade of C-|May be taken concurrently  
OR MA07 Y|May not be taken concurrently  
OR MATW Y|May not be taken concurrently)  
AND (ACCT 2101|Minimum Grade of C|May not be taken concurrently  
OR ACCT 2901|Minimum Grade of C|May not be taken concurrently  
OR ACC1 Y|May not be taken concurrently)  
AND (AS 2502|Minimum Grade of C|May not be taken concurrently)

**AS 2504. Advanced Theory of Interest. 3 Credit Hours.**

This course develops the theoretical basis of certain actuarial models and the application of those models to insurance and other financial risks. It prepares students for SOA Exam MFE or CAS Exam 3F. Topics covered in this course include Vasicek and Cox-Ingersoll-Ross bond price models, Black-Derman-Toy binomial model, Black-Scholes option-pricing model, exotic options, Itô's lemma in the one-dimensional case. Simulation of lognormal stock prices and variance reduction techniques will be discussed and delta-hedging in risk management will be demonstrated.

**College Restrictions:** Must be enrolled in one of the following Colleges: Business & Mngmnt, Fox School.

**Repeatability:** This course may not be repeated for additional credits.

**Pre-requisites:**

(AS 2502|Minimum Grade of C|May not be taken concurrently  
AND AS 2503|Minimum Grade of C|May not be taken concurrently)

**AS 3501. Actuarial Modeling I. 3 Credit Hours.**

This course introduces the discrete and continuous random variables measuring the future lifetime of a person. Among the topics covered are calculation of the mean, variance and probability functions for these random variables, introduction of a present value random variable measuring the present value of a life insurance and annuity benefit, calculation of premiums for life insurance and annuities using interest rates and calculation of reserves for insurance companies, examining future liabilities and inflow. NOTE: A grade of C or better is required in this course to be eligible to take Actuarial Science 3502.

**College Restrictions:** Must be enrolled in one of the following Colleges: Business & Mngmnt, Fox School.

**Repeatability:** This course may not be repeated for additional credits.

**Pre-requisites:**

(AS 2502|Minimum Grade of C|May not be taken concurrently)

AND (AS 2101|Minimum Grade of C|May not be taken concurrently)

**AS 3502. Actuarial Modeling II. 3 Credit Hours.**

This course introduces the evaluation and calculation of reserves for various continuous and discrete policies. Multi-state models are presented, with applications in multiple decrement theory and multiple lives. The valuation of life insurance and annuities is then reexamined, allowing for interest rate and mortality adjustments. The profitability of insurance products is then discussed and calculated.

**College Restrictions:** Must be enrolled in one of the following Colleges: Business & Mngmnt, Fox School.

**Repeatability:** This course may not be repeated for additional credits.

**Pre-requisites:**

AS 3501|Minimum Grade of C|May not be taken concurrently.

**AS 3503. Actuarial Modeling III. 3 Credit Hours.**

Estimation and fitting of survival, frequency and severity, and compound distribution loss models; credibility methods.

**College Restrictions:** Must be enrolled in one of the following Colleges: Business & Mngmnt, Fox School.

**Repeatability:** This course may not be repeated for additional credits.

**Pre-requisites:**

STAT 2512|Minimum Grade of C|May not be taken concurrently.

**AS 3504. Actuarial Analytics. 3 Credit Hours.**

The course introduces students to linear regression models and time series analysis, with a focus on applying these tools to actuarial business decisions in an insurance or consulting environment. Statistical analyses have quickly become part of the modern actuary's day-to-day responsibilities as they help improve solutions to traditional actuarial problems such as estimating mortality, setting loss reserves, predicting policyholder behavior, and establishing classification ratemaking schemes. In addition, actuaries have started to use predictive modeling techniques to improve insurance operations and business processes that have traditionally relied largely on the managers' judgment. The course aims to prepare students for the data analytics responsibilities of actuaries through its discussion of statistical techniques and actuarial applications of predictive analytics, and development of programming skills in SAS and R.

**Repeatability:** This course may not be repeated for additional credits.

**Pre-requisites:**

STAT 2512|Minimum Grade of C|May not be taken concurrently.

**AS 3580. Special Topics: Actuarial Science. 3 Credit Hours.**

Special topics in current developments in the field of Actuarial Science and exam preparation.

**College Restrictions:** Must be enrolled in one of the following Colleges: Business & Mngmnt, Fox School.

**Repeatability:** This course may be repeated for additional credit.

**AS 3582. Independent Study. 1 to 6 Credit Hour.**

Readings and/or research paper under the supervision of a faculty member.

**College Restrictions:** Must be enrolled in one of the following Colleges: Business & Mngmnt, Fox School.

**Repeatability:** This course may be repeated for additional credit.

**AS 3596. Actuarial Practice: Property and Liability. 3 Credit Hours.**

This highly participative course is designed to broaden perspectives on the business environment in which actuaries work. In addition to analyzing the issues behind daily events, several continuing issues will be analyzed including insurance pricing cycles, regulatory developments, the role of the actuary as an educator, advisor, objective information source and problem solver, insurance company financial rating and solvency issues, accounting fraud and questionable financial transactions, insurance and the financial markets managing insurance operations, professional ethics, and the impact of current developments in underwriting, and reinsurance on the actuarial function. NOTE: This is the writing-intensive course for Actuarial Science majors. Students must earn a grade of C in this course if they are using it to fill the writing intensive course requirement for their degree. Also note: Prior to fall 2017, the course title was "Casualty Contingencies."

**College Restrictions:** Must be enrolled in one of the following Colleges: Business & Mngmnt, Fox School.

**Course Attributes:** WI

**Repeatability:** This course may not be repeated for additional credits.

**Pre-requisites:**

(ACCT 2101|Minimum Grade of C|May not be taken concurrently  
 OR ACCT 2901|Minimum Grade of C|May not be taken concurrently)  
 AND (AS 1501|Minimum Grade of C|May not be taken concurrently  
 OR AS 1901|Minimum Grade of C|May not be taken concurrently)  
 AND (MATH 2043|Minimum Grade of C|May not be taken concurrently  
 OR MATH 2943|Minimum Grade of C|May not be taken concurrently  
 OR MA08 Y|May not be taken concurrently)  
 AND (RMI 2101|Minimum Grade of C|May not be taken concurrently  
 OR RMI 2901|Minimum Grade of C|May not be taken concurrently  
 OR RM01 Y|May not be taken concurrently)  
 AND (BA 2196|Minimum Grade of C|May not be taken concurrently  
 OR BA 2996|Minimum Grade of C|May not be taken concurrently)

**AS 3597. Actuarial Practice: Group & Health Benefits. 3 Credit Hours.**

This highly participative and writing intensive course is designed to expose students to certain group health and welfare benefits, the legal and regulatory environment in which they operate, and the fundamentals of group insurance pricing, rating and funding. Benefits examined include traditional benefits such as medical and disability insurance in addition to dental and prescription drug plans, HMOs, PPOs, ACOs, and other managed care systems. Emphasis will be on the design and structure of these plans, development and pricing of group products, experience rating and funding methods, and current problems and issues associated with the provision of these benefits. The salient features of state and federal regulation will be examined, along with an examination of the Affordable Care Act (ACA) major provisions of interest to practicing actuaries and employers.

**Course Attributes:** WI

**Repeatability:** This course may not be repeated for additional credits.

**Pre-requisites:**

(ACCT 2101|Minimum Grade of C|May not be taken concurrently  
 OR ACCT 2901|Minimum Grade of C|May not be taken concurrently)  
 AND (AS 1501|Minimum Grade of C|May not be taken concurrently  
 OR AS 1901|Minimum Grade of C|May not be taken concurrently)  
 AND (MATH 2043|Minimum Grade of C|May not be taken concurrently  
 OR MATH 2943|Minimum Grade of C|May not be taken concurrently)  
 AND (RMI 2101|Minimum Grade of C|May not be taken concurrently  
 OR RMI 2901|Minimum Grade of C|May not be taken concurrently)  
 AND (BA 2196|Minimum Grade of C|May not be taken concurrently  
 OR BA 2996|Minimum Grade of C|May not be taken concurrently)

**AS 3999. Honors Thesis I. 1 to 3 Credit Hour.**

The first of a two-part sequence of courses in which independent research is conducted under the supervision of a thesis advisor from the Actuarial Science department resulting in a substantial piece of original research, roughly 30 to 50 pages in length upon completion of Actuarial Science 4999. The student must publicly present his/her findings at a Temple University Research Forum session or the equivalent during one of the two semesters during which these courses are undertaken.

**Field of Study Restrictions:** Must be enrolled in one of the following Majors: Actuarial Science.

**College Restrictions:** Must be enrolled in one of the following Colleges: Business & Mngmnt, Fox School.

**Cohort Restrictions:** Must be enrolled in one of the following Cohorts: SCHONORS, UHONORS, UHONORSTR.

**Course Attributes:** HO

**Repeatability:** This course may be repeated for additional credit.

**AS 4999. Honors Senior Thesis II. 1 to 3 Credit Hour.**

Independent research conducted under the supervision of a thesis advisor from the Actuarial Science Department resulting in a substantial piece of original research, roughly 30 to 50 pages in length. Student must publicly present his/her findings at a Temple University Research Forum session or the equivalent if this was not done in Actuarial Science 3999.

**Field of Study Restrictions:** Must be enrolled in one of the following Majors: Actuarial Science.

**College Restrictions:** Must be enrolled in one of the following Colleges: Business & Mngmnt, Fox School.

**Cohort Restrictions:** Must be enrolled in one of the following Cohorts: SCHONORS, UHONORS, UHONORSTR.

**Course Attributes:** HO

**Repeatability:** This course may be repeated for additional credit.

**Pre-requisites:**

AS 3999|Minimum Grade of C-|May not be taken concurrently.