STATISTICS (STAT)

STAT 2601 Introductory Statistics 3 s.h.
Designed for students from different disciplines who desire an introduction to statistical reasoning. Topics include collecting and summarizing data, concepts of randomness and sampling, statistical inference and reasoning, correlation and regression. Credit will not be given for both STAT 2601 and STAT 2625.
Prereq.: level 35 or higher on the Math Placement Test.
Gen Ed: Mathematics.

STAT 2625 Stat Lit and Crit Reasoning 4 s.h.
An introduction to statistics and its applications. Topics include descriptive statistics, experimental design, probability sampling distribution, statistical inference, correlation and regression. Emphasis on applications, critical reasoning, and data analysis using statistical software. Credit will not be given for both MATH 2623 and STAT 2625.
Prereq.: at least Level 20 on the Mathematics Placement Test or Level 10 on the Mathematics Placement Test and concurrent enrollment in STAT 2625C.

STAT 2625C Corequisite Support for Statistical Literacy and Critical Reasoning 1-3 s.h.
This course is intended to provide corequisite support for students requiring remediation in mathematics while they are concurrently enrolled in STAT 2625 (Statistical Literacy and Critical Reasoning). Emphasis will be placed on prerequisite skills needed for statistics as well as just in time review through the use of appropriate technology. Does not count toward a degree. 1 - 3 s.h.
Prereq.: Concurrent enrollment in STAT 2625.

STAT 3717 Statistical Methods 4 s.h.
Probability and statistics designed for students majoring in the natural sciences. Topics include descriptive statistics, probability, estimation, testing hypotheses, analysis of variance, regression and nonparametric statistics. Use of personal computers with computer software will be required. Credit will not be given for both MATH 1552 or MATH 1570 or MATH 1571 or MATH 1585H or equivalent.

Prereq.: MATH 1552 or MATH 1570 or MATH 1571 or MATH 1585H or equivalent.

STAT 3717H Honors Statistical Methods 4 s.h.
Probability and statistics designed for students majoring in the natural sciences. Topics include descriptive statistics, probability, estimation, testing hypotheses, analysis of variance, regression and nonparametric statistics. Use of personal computers with computer software will be required. Credit will not be given for both MATH 1552 or MATH 1570 or MATH 1571 or MATH 1585H or equivalent.

Prereq.: MATH 1549 or MATH 1570 or MATH 1571 or MATH 1585H or equivalent.

STAT 3743 Probability and Statistics 4 s.h.
A calculus-based probability and statistics course. Topics include descriptive statistics, probability models and related concepts and applications, statistical estimation, and hypothesis testing. Credit will not be given for both STAT 3717 and STAT 3743.

Prereq.: MATH 1572 or MATH 1585H.

STAT 3781H Honors Biostatistics 3 s.h.
Descriptive statistics, testing hypotheses, analysis of count data, correlation, regression, nonparametric statistics, and analysis of variance with applications relating to biological and health sciences.
Prereq.: MATH 1580H and MATH 1581H, or equivalent.

STAT 4804 Actuarial Models 1 3 s.h.
The statistical foundation of actuarial contingency models including the study of survival and severity distributions. Other topics selected from life insurance and annuities, benefit premiums, reserves, and applications.
Prereq.: STAT 3743 or consent of department chairperson.

STAT 4805 Actuarial Models 2 3 s.h.
The statistical foundation of actuarial contingency models including the analysis of benefit reserves. Other topics selected from multiple life functions and decrement models, insurance models, and applications.
Prereq.: STAT 3743 or consent of department chairperson.

STAT 4812 Statistical Analysis System for Data and Analytics 3 s.h.
An introduction to SAS programming for data and analytics. Topics include using SAS for data processing, manipulation, visualization, reporting, and statistical analysis. The objective is for students to develop statistical computing skills for problem solving and decision making.
Prereq.: STAT 3717 or STAT 3743 or equivalent.

STAT 4817 Applied Statistics 3 s.h.
Application of regression, survey sampling, analysis of variance, design and analysis of experiments, and related topics.
Prereq.: STAT 3717 or STAT 3743 or equivalent.

STAT 4843 Theory of Probability 3 s.h.
The mathematical foundation of probability theory including the study of discrete and continuous distributions. Other topics selected from limit theorems, generating functions, stochastic processes, and applications. Listed also as MATH 4843. Credit for STAT 4843 will not be given to students with MATH 4843.
Prereq.: MATH 2673 or MATH 2686H or consent of department chairperson.

STAT 4844 Theory of Statistics 3 s.h.
The mathematical theory of statistical inferences including likelihood principle, sufficient statistics, theory of statistical estimation, hypothesis testing and related topics.
Prereq.: STAT 4843.

STAT 4845 Stochastic Process Models 3 s.h.
Introduction to the mathematical foundations of the theory and application of stochastic processes. Topics include Markov processes, Poisson processes, queueing theory, and simulation. Other topics selected from limit theorems, Brownian Motion, and stationary processes.
Prereq.: STAT 4843.

STAT 4848 Applied Regression Time Series 3 s.h.
Statistical methods for regression and time series analysis. Topics include applied linear regression with model fitting and diagnostics, data analysis, and forecasting with time series models.
Prereq.: STAT 3717 or STAT 3743.

STAT 4849 Design of Experiments 3 s.h.
The objective of this course is to learn how to plan, design and conduct experiments efficiently, and apply statistical techniques on resulting data to obtain conclusions. Topics include introduction of experiments, complete randomized designs, blocking designs, factorial designs, nested designs, and random effects models.
Prereq.: STAT 4817 or MATH 6940 or equivalent.

STAT 4888 Actuarial Models in Financial Economics 3 s.h.
An introduction to actuarial models in financial economics. Topics include the Black-Scholes framework for pricing derivatives, the binomial pricing model, and interest rate models.
Prereq.: STAT 4843.

STAT 4896 Statistical Project 2 s.h.
Individualized study of a topic in statistics culminating in a written report and an oral presentation. May be repeated once.
Prereq.: STAT 4817 and permission of chairperson.
Gen Ed: Capstone.

STAT 5800 Mathematical Foundations of Actuarial Science 3 s.h.
A survey of probability theory and an introduction to risk management. Emphasis of the course will be on problem solving with applications in actuarial science.
Prereq.: STAT 4843 or consent of instructor.

STAT 5802 Theory of Interest 3 s.h.
Mathematical theory and techniques in analysis of interest. Topics include measurement of interest, force of interest, annuities, amortization, pricing of investment products, and applications to actuarial sciences.
Prereq.: MATH 1572 and any 3700 level MATH, STAT, ECON, or FIN course.
STAT 5806 Seminar in Actuarial Science 2-3 s.h. Approaches to and practice with problem solving in actuarial science. Topics may include financial mathematics, financial economics, or actuarial modeling. May be repeated once. Not applicable to the mathematics major. Prereq.: STAT 4843 or consent of the instructor.

STAT 5811 SAS Programming for Data Analytics 3 s.h. An introduction to SAS programming for data analytics. Topics include using SAS for data processing, manipulation, visualization, reporting and statistical analysis. The objective is for students to develop statistical computing skills for problem solving and decision making. Also listed as ECON 5861. Prereq.: STAT 3717 or STAT 3743 or STAT 2601 or ECON 3790 or equivalent.

STAT 5814 Statistical Data Mining 3 s.h. A systematic introduction to data mining with emphasis on various data mining problems and their solutions. Topics include data mining processes and issues, exploratory data analysis, supervised and unsupervised learning, classification, and prediction methods. Prereq.: STAT 3717 or STAT 3743, or consent of department chairperson.

STAT 5819 Bayesian Statistics 3 s.h. An introduction to the Bayesian approach to statistical inference for data analysis in a variety of applications. Data analysis using statistical software will be emphasized. Topics include: comparison of Bayesian and frequentist methods, Bayesian model specification, prior specification, basics of decision theory, Markov chain Monte Carlo, Bayes factor, empirical Bayes, Bayesian linear regression and generalized linear models, hierarchical models. Prereq.: STAT 3717 or STAT 3743 or STAT 4817 or STAT 6940 or equivalent.

STAT 5840 Statistical Computing 3 s.h. Computational methods used in statistics. Topics include generation and testing of random numbers, computer intensive methods, and simulation studies. Prereq.: STAT 3717 or STAT 3743.

STAT 5846 Categorical Data Analysis 3 s.h. Discrete distributions, contingency table analysis, odds ratios, relative risk, logistic regression, hierarchical models. Prereq.: STAT 4817 or STAT 4844.

STAT 5847 Nonparametric Statistics 3 s.h. Nonparametric statistical inference including tests of hypotheses for one sample, two or more related independent samples, dependence, goodness-of-fit, trend, and related topics. Prereq.: STAT 3717 or STAT 3743 or equivalent.

STAT 5849 Multivariate Statistical Analysis 3 s.h. The statistical analysis of multivariate observations. Topics include multivariate probability distribution theory, regression, analysis of variance, and techniques in data analysis. Prereq.: MATH 3720 and STAT 4844 or equivalent.

STAT 5857 Statistical Consulting 3 s.h. The objective of this course is to cultivate the skills necessary to competently engage in statistical consulting. Topics include problem solving, study design, power and sample size, data management, selection and application of statistical methods, ethical practice, and effective visual and literal communication of results. Prereq.: STAT 4817 or equivalent.

STAT 5895 Special Topics in Statistics 2-3 s.h. The study of a standard statistical topic in depth or the development of a special area of statistics. May be repeated twice. Prereq.: STAT 3717 or STAT 3743.

STAT 6904 Life Contingency Modeling 1 3 s.h. An introduction to various statistical, financial, and mathematical models used to determine insurance premiums. These models identify contingency risks and are based upon individual risk model frameworks. Prereq.: STAT 4843, STAT 6943, or consent of the instructor.

STAT 6905 Life Contingency Modeling 2 3 s.h. An introduction to multiple life functions, multiple decrement models, valuation theory for pension plans, insurance models including expenses, nonforfeiture benefits and dividends, and other means to determine benefit premiums. Prereq.: STAT 6904.

STAT 6910 Loss Models 3 s.h. An introduction to the development of loss and severity models used in actuarial science and the statistical methods used to estimate the parameters of such models. Additional topics, including credibility and simulation, may be covered. Prereq.: STAT 4844, STAT 6944 or equivalent.

STAT 6912 Advanced SAS Programming for Data Analytics 3 s.h. This course is designed to provide students with training in advanced SAS programming for data analytics. Main topics include SQL, macro language, selected SAS statistical analysis procedures, and working with large data sets. Also listed as ECON 6992. Prereq.: STAT 6940 or ECON 6976.

STAT 6940 Advanced Data Analysis 3 s.h. An overview of techniques in data analysis. Includes a strong emphasis on visual interpretation of data. Topics include one or more samples, proportions, odds, regression, and multiple comparisons. Prereq.: STAT 4844, or permission of graduate coordinator.

STAT 6943 Mathematical Statistics 1 3 s.h. Random variables, their distributions and densities. Families and exponential families of distribution. Independence, joint distributions, conditional probability and expectation. Convergence and limit theorems. Credit will not be given for both STAT 4843 and STAT 6943. Prereq.: MATH 3751 or MATH 5851 or permission of graduate coordinator.

STAT 6944 Mathematical Statistics 2 3 s.h. A study of theories and properties of statistical hypothesis testing and estimation, including maximum likelihood method, likelihood ratio tests, sufficiency, and related topics. Credit will not be given for both STAT 4844 and STAT 6944. Prereq.: STAT 4843 or STAT 6943 or permission of graduate coordinator.

STAT 6945 Stochastic Processes 3 s.h. An advanced study of stochastic processes. Topics include Markov chains; Poisson process; nonhomogeneous Poisson processes; renewal theory; conditional probability and expectation. Prereq.: STAT 4843 or STAT 6943, or permission of graduate coordinator.

STAT 6946 Sampling Methods 3 s.h. Methods for survey and design and analysis. Topics include basic theory of surveys, descriptions of data, sampling distributions, design of survey, sources of error, questionnaire design, and sampling techniques. Prereq.: STAT 4817 or permission of graduate coordinator.

STAT 6948 Linear Models 3 s.h. A study of linear statistical models of the relationship between analysis of variance and regression and the assumptions underlying the analysis of variance. Prereq.: MATH 3720 Linear Algebra and Matrix Theory and either STAT 4844 or STAT 6944, or permission of graduate coordinator.

STAT 6949 Design and Analysis of Experiments 3 s.h. Fundamental principles of design and analysis of experiments. Topics include blocking; multifactor testing; multiple comparisons; repeated measures; crossing and nesting designs. Prereq.: STAT 4844 or STAT 6944; or permission of graduate coordinator.

STAT 6988 Modeling in Financial Economics 3 s.h. A study of modeling and evaluation of derivatives and bonds and risk management using derivatives. Topics cover various models in asset evaluation, such as bond price models, the Black-Scholes model, diffusion processes, and risk management. Also listed as ECON 6988. Prereq.: STAT 4843 or STAT 6943 or ECON 6976.