STATISTICS (STA)

Statistics (STA) Courses

STA 1053. Basic Statistics. (3-0) 3 Credit Hours. (TCCN = MATH 1342)
Prerequisite: Satisfactory performance on placement examination. Descriptive statistics; histograms; measures of location and dispersion; elementary probability theory; random variables; discrete and continuous distributions; interval estimation and hypothesis testing; simple linear regression and correlation; one-way analysis of variance, and applications of the chi-square distribution. May be applied toward the core curriculum requirement in Mathematics. Generally offered: Fall, Spring, Summer. Course Fees: BISP $10; BTSI $15.41; DL01 $75; LRB1 $15.41; LRC1 $12.

STA 1403. Probability and Statistics for the Biosciences. (3-0) 3 Credit Hours.
Prerequisite: A grade of "C-" or better in MAT 1193 or an equivalent. Probability and statistics from a dynamical perspective, using discrete-time dynamical systems and differential equations to model fundamental stochastic processes such as Markov chains and the Poisson processes important in biomedical applications. Specific topics to be covered include probability theory, conditional probability, Markov chains, Poisson processes, random variables, descriptive statistics, covariance and correlations, the binomial distribution, parameter estimation, hypothesis testing and regression. (Formerly STA 1404. Credit cannot be earned for both STA 1403 and STA 1404.) Generally offered: Fall, Spring, Summer. Course Fees: BISP $10; BTSI $15.41; LRB1 $15.41; DL01 $75.

STA 2303. Applied Probability and Statistics for Engineers. (3-0) 3 Credit Hours.
Prerequisite: MAT 1223. Fundamental concepts of probability and statistics with practical applications to engineering problems. Emphasis on statistical distribution models used in reliability and risk analysis of engineering design; probabilistic reasoning; Bayes' theorem; bivariate and multivariate distributions and their applications. Generally offered: Fall, Spring. Course Fee: BISP $10; BTSI $15.41; LRB1 $15.41; DL01 $75.

STA 3003. Statistical Methods and Applications. (3-0) 3 Credit Hours.
Prerequisite: Completion of MAT 1093 (or equivalent). Introduction to the Scientific Method, principles of sampling and experimentation, scales of measurement, summary statistics, introduction to basic probability, models for discrete and continuous data, simple simulations, fundamentals of hypothesis testing and confidence intervals, and introduction to analysis of variance and linear regression model. The course will emphasize data analysis and interpretation, and effective communication of results through reports or presentations. Generally offered: Fall, Spring, Summer. This course has Differential Tuition. Course Fee: DL01 $75.

STA 3013. Applied Multivariate Analysis. (3-0) 3 Credit Hours.
Prerequisite: MAT 2233, STA 3003, or equivalents. This course emphasizes application of statistics in organizations. Topics include but are not limited to multivariate normal distribution, tests on means, discriminant analysis, cluster analysis, principal components, and factor analysis. Use of software packages will be emphasized. Open to students of all disciplines. Generally offered: Spring. This course has Differential Tuition.

STA 3023. Mathematics for Statistics. (3-0) 3 Credit Hours.
Prerequisite: MAT 1223 or an equivalent. This course discusses and reviews the classic mathematical methods and techniques to comprehend the advanced statistical concepts. Concepts include sequences, series, convergence, limit, continuity, derivative, optimization, the fundamental theorem of calculus, methods of integration, Taylor expansions, function of several variables, partial derivatives, and multivariate transformations. Other topics include vector and matrix algebra, determinants, inverse matrix, solving linear equations, orthogonality (projections, least-squares, Gram-Schmidt), eigenvalues and eigenvectors (diagonalization, symmetric/positive definite matrices), and singular value decomposition. (Formerly titled Statistical Mathematics.) This course has Differential Tuition.

STA 3313. Statistical Sampling. (3-0) 3 Credit Hours.
Prerequisite: One of the following: MS 1023, STA 1053, STA 2303, STA 3003, or an equivalent. Research techniques for collecting quantitative data: sample surveys, designed experiments, simulations, and observational studies; development of survey and experimental protocols; measuring and controlling sources of measurement error. Generally offered: Fall. This course has Differential Tuition. Course Fee: DL01 $75.

STA 3333. Introduction to Data Science and Analytics. (3-0) 3 Credit Hours.
Prerequisite: One of the following: MS 1023, STA 1053, STA 1403, STA 2303, or an equivalent. Data science and analytics aim to harness the power of data and statistics for new insights. This course introduces the concepts and principles of data science and analytics through software-aided applications of common statistics-based methods, tools and techniques in various practical case studies. This course also provides students an opportunity to understand the data-driven decision making process, an overview of the data science lifecycle, and the Big Data ecosystem. Topics include popular statistical techniques and algorithms under the current paradigm of analytics (descriptive/ diagnostic, predictive/prognostic, and prescriptive/optimization) and machine learning (supervised and unsupervised), applied in a wide variety of fields as demonstrated through case studies. With the application-oriented focus, students will gain hands-on experiences and develop essential skills in discovering, analyzing, visualizing, interpreting data, presenting and communicating results. This course has Differential Tuition.

STA 3513. Probability and Statistics. (3-0) 3 Credit Hours.
Prerequisite: STA 3003, MAT 1223 or STA 3023, and completion of or concurrent enrollment in MAT 2213. Axiomatic probability, random variables, discrete and continuous distributions, bivariate and multivariate distributions and their applications, mixture distributions, moments and generating functions, and bivariate transformations. Generally offered: Fall, Spring, Summer. This course has Differential Tuition. Course Fee: DL01 $75.

STA 3523. Mathematical Statistics for Inference. (3-0) 3 Credit Hours.
Prerequisite: STA 3513 or an equivalent. Sampling distributions and the Central Limit Theorem; order statistics; estimation including method of moments and maximum likelihood; properties of estimators; hypothesis testing including likelihood ratio tests; introduction to ANOVA and regression. Generally offered: Fall, Spring. This course has Differential Tuition. Course fee: DL01 $75.

STA 4133. Introduction to Programming and Data Management in SAS. (3-0) 3 Credit Hours.
This course introduces essential programming concepts using the statistical software package SAS (Enterprise Guide and Base SAS) with a focus on data management and the preparation of data for statistical analyses. Topics include reading raw data, creating temporary and permanent datasets, manipulating datasets, data prompts, summarizing data, displaying data using tables, charts, and plots. Conducting basic statistical analyses using the SAS Enterprise Guide and the Base SAS procedures are also discussed with the examples selected from regression analysis, analysis of variance, and categorical analysis. This course also demonstrates how to write, generate, and modify SAS code and procedures within the SAS Enterprise Guide and the Base SAS environments. This course has Differential Tuition. Course fee: DL01 $75.

STA 4143. Data Mining and Predictive Modeling. (3-0) 3 Credit Hours.
Prerequisite: STA 4133 or equivalent. Acquisition, organization, exploration, and interpretation of large data collections. Data cleaning, representation and dimensionality, multivariate visualization, clustering, classification, and association rule development. A variety of commercial and research software packages will be used. This course has Differential Tuition. Course fee: DL01 $75.

STA 4233. Introduction to Programming and Data Management in R. (3-0) 3 Credit Hours.
This course introduces statistical computing and programming using the R language. Topics include preprocessing/manipulating datasets, summarizing/visualizing data, and conducting basic statistical analyses using R. Other topics include writing R functions, object oriented programming, statistical simulation and resampling, interfacing R with other programming language environments such as SQL, Python, C++, and Hadoop. Techniques for efficient programming will be stressed. The concept of high-performance computing (multi-core/parallel-processing) is also demonstrated. (Formerly titled Statistical Applications Using SAS Software.) Generally offered: Spring. This course has Differential Tuition. Course fee: DL01 $75.

STA 4243. Data Exploratory Methods with Python. (3-0) 3 Credit Hours.
This course provides an overview of Exploratory Data Analysis (EDA), including the cleaning, preparation, exploration, and visualization of data. Students will learn how to source, manage, transform, and explore a wide variety of data types. Students will also master the fundamental concepts for visualizing and communicating information contained in raw data. Python software is used for the course. Prior knowledge of a programming language and basic statistics is beneficial but is not required. This course has Differential Tuition.

STA 4643. Introduction to Stochastic Processes. (3-0) 3 Credit Hours.
Prerequisite: MAT 2233 and STA 3513 (or equivalents). Probability models, Poisson processes, finite Markov chains, including transition probabilities, classification of states, limit theorems, queuing theory, and birth and death processes. Generally offered: Summer. This course has Differential Tuition. Course Fees: BISP $10; BTSI $15.41; LRB1 $15.41.

STA 4713. Applied Regression Analysis. (3-0) 3 Credit Hours.
Prerequisite: Completion of or concurrent enrollment in STA 3523, or consent from instructor. An introduction to regression analysis, with emphasis on practical aspects, fitting a straight line, examination of residuals, matrix treatment of regression analysis, fitting and evaluation of general linear models, and nonlinear regression. Generally offered: Fall. This course has Differential Tuition.

STA 4723. Introduction to the Design of Experiments. (3-0) 3 Credit Hours.
Prerequisite: STA 3513, or equivalents. General concepts in the design and analysis of experiments. Emphasis will be placed on both the experimental designs and analysis, and tests of the validity of assumptions. Topics covered include completely randomized designs, randomized block designs, complete factorials, fractional factorials, and covariance analysis. The use of computer software packages will be stressed. This course has Differential Tuition. Course Fee: DL01 $75.

STA 4753. Time-Series Analysis. (3-0) 3 Credit Hours.
Prerequisite: STA 3003 and STA 3513, or equivalents. Development of descriptive and predictive models for time-series phenomena. A variety of modeling approaches will be discussed: decomposition, moving averages, time-series regression, ARIMA, and forecasting errors and confidence intervals. Generally offered: Spring. This course has Differential Tuition.

STA 4803. Statistical Quality Control. (3-0) 3 Credit Hours.
Prerequisite: STA 3003, STA 3513, (or equivalents). Statistical methods are introduced in terms of problems that arise in manufacturing and their applications to the control of manufacturing processes. Topics include control charts and acceptance sampling plans. (Same as MS 4363 and MAT 4803. Credit cannot be earned for more than one of the following: STA 4803, MS 4363, or MAT 4803.) This course has Differential Tuition.

STA 4903. Applied Survival Analysis. (3-0) 3 Credit Hours.
Prerequisite: STA 3513 or an equivalent. Measures of survival, hazard function, mean residual life function, common failure distributions, procedures for selecting an appropriate model, the proportional hazards model. Emphasis on application and data analysis using SAS. This course has Differential Tuition.

STA 4911. Independent Study. (0-0) 1 Credit Hour.
Prerequisite: A 3.0 Carlos Alvarez College of Business grade point average, permission in writing (form available) from the instructor, the student's advisor, the Department Chair, and the Dean of the College in which the course is offered. Independent reading, research, discussion, and/or writing under the direction of a faculty member. May be repeated for credit, but not more than 6 semester credit hours, regardless of discipline, will apply to a bachelor's degree. This course has Differential Tuition. Course Fee: BISP $10; BTSI $15.41.

STA 4913. Independent Study in Statistics and Data Science. (0-0) 3 Credit Hours.
Prerequisites: A 3.0 Carlos Alvarez College of Business grade point average, permission in writing (form available) from the instructor, the student's advisor, the Department Chair, and the Dean of the College in which the course is offered. Independent reading, research, discussion, and/or writing under the direction of a faculty member. May be repeated for credit, but not more than 6 semester credit hours, regardless of discipline, will apply to a bachelor's degree. This course has Differential Tuition.

STA 4933. Internship in Statistics and Data Science. (0-0) 3 Credit Hours.
Prerequisites: A 2.5 grade UTSA point average, and approval in writing from the instructor, the Department Chair, and the Associate/Assistant Dean of Undergraduate Studies in the Carlos Alvarez College of Business (see academic advisor for required forms and additional requirements). Supervised full- or part-time work experience in statistics. Offers opportunities for applying statistics in private businesses or public agencies. A written report is required. May be repeated for credit, but not more than 6 semester credit hours will apply to a bachelor's degree. This course has Differential Tuition.

STA 4953. Special Topics in Statistics and Data Science. (3-0) 3 Credit Hours.
Prerequisite: Consent from the instructor, Department Chair, and Dean of the College. An organized course offering the opportunity for specialized study not normally or not often available as part of the regular course offerings. Special Topics may be repeated for credit when the topics vary, but not more than 6 semester credit hours, regardless of discipline, will apply to a bachelor's degree. This course has Differential Tuition.

STA 4961. Actuarial Science Examination Preparation. (1-0) 1 Credit Hour.
An organized course offering specialized study for Actuarial Science Examinations. Topics covered include General Probability, Random Variables and Probability Distributions, Multivariate Distributions, and Risk Management and Insurance. May be repeated twice for credit. Generally offered: Fall, Spring. This course has Differential Tuition. Course Fee: BISP $10; BTSI $15.41; LRB1 $15.41.

STA 4963. Actuarial Science Examination Preparation. (3-0) 3 Credit Hours.
Prerequisite: STA 3513. An organized course offering specialized study for Actuarial Science Examination. Topics covered include General Probability, Random Variables and Probability Distributions, Multivariate Distributions, and Stochastic Processes. This course has Differential Tuition. Course Fee: DL01 $75.

STA 4993. Honors Thesis. (0-0) 3 Credit Hours.
Prerequisites: STA 3523 and consent from instructor, Department Chair and Dean of the College; enrollment limited to students applying for Honors in Management Science and Statistics. Supervised research and preparation of an honors thesis. May be repeated once for credit with advisor's approval. Generally offered: Spring. This course has Differential Tuition.