STAT - STATISTICS (STAT)

STAT 182 Foundations of Statistics
Credit 1. 1 Lecture Hour.
Elementary topics in statistics; data collection; design of experiments; confidence intervals, hypothesis testing; ethics in statistics; the role of statistics in industry, the health profession and the sciences.
Prerequisite: Statistics majors only.

STAT 201 Elementary Statistical Inference
Credits 3. 3 Lecture Hours.
(MATH 1342, 1442) Elementary Statistical Inference. Data collection, tabulation and presentation; elementary description of the tools of statistical inference; probability, sampling and hypothesis testing; applications of statistical techniques to practical problems; cannot be taken after or concurrently with any other course in statistics or SCMT 303. Only one of the following will satisfy the requirements for a degree: STAT 201, STAT 301, STAT 302 or STAT 303.

STAT 211 Principles of Statistics I
Credits 3. 3 Lecture Hours.
Introduction to probability and probability distributions; sampling and descriptive measures; inference and hypothesis testing; linear regression, analysis of variance.
Prerequisite: MATH 148, MATH 152, or MATH 172; also taught at Galveston campus.

STAT 212 Principles of Statistics II
Credits 3. 3 Lecture Hours.
Design of experiments, model building, multiple regression, nonparametric techniques and contingency tables.
Prerequisite: STAT 211.

STAT 301 Introduction to Biometry
Credits 3. 3 Lecture Hours.
Intended for students in animal sciences. Introduces fundamental concepts of biometry including measures of location and variation, probability, tests of significance, regression, correlation and analysis of variance which are used in advanced courses and are being widely applied to animal-oriented industry. Only one of the following will satisfy the requirements for a degree: STAT 201, STAT 301, STAT 302 or STAT 303.
Prerequisite: MATH 168 or MATH 166 or equivalent; junior or senior classification.

STAT 302 Statistical Methods
Credits 3. 3 Lecture Hours.
Intended for undergraduates in the biological sciences. Introduction to concepts of random sampling and statistical inference; estimation and testing hypotheses of means and variances; analysis of variance; regression analysis; chi-square tests. Only one of the following will satisfy the requirements for a degree: STAT 201, STAT 301, STAT 302 or STAT 303.
Prerequisite: MATH 168 or MATH 166 or equivalent; junior or senior classification.

STAT 303 Statistical Methods
Credits 3. 3 Lecture Hours.
Intended for undergraduates in the social sciences. Introduction to concepts of random sampling and statistical inference, estimation and testing hypotheses of means and variances, analysis of variance, regression analysis, chi-square tests. Only one of the following will satisfy the requirements for a degree: STAT 201, STAT 301, STAT 302 or STAT 303.
Prerequisite: MATH 168 or MATH 166 or equivalent; junior or senior classification; also taught at Galveston campus.

STAT 307 Sample Survey Techniques
Credits 3. 3 Lecture Hours.
Concepts of population and sample; the organization of a sample survey; questionnaire design. Basic survey designs and computation of estimates and variances.
Prerequisite: STAT 301 or STAT 302 or STAT 303 or SCMT 303.

STAT 312 Statistics for Biology
Credits 3. 3 Lecture Hours.
Statistical methods for biological applications including the topics multiple linear regression, experimental design, analysis of variance, categorical data analysis, nonparametric methods, general linear models, density estimation, nonlinear and logistic regression and inference for percentiles.
Prerequisites: MATH 147 or equivalent; STAT 201 or MATH 148, or equivalents.

STAT 335/CSCE 320 Principles of Data Science
Credits 3. 3 Lecture Hours.
Theoretical foundations, algorithms and methods of deriving valuable insights from data; includes foundations in managing and analyzing data at scale, e.g. big data; data mining techniques and algorithms; exploratory data analysis; statistical methods and models; data visualization.
Prerequisites: STAT 211 or ECEN 303; STAT 212 or CSCE 222/ECEN 222.
Cross Listing: CSCE 320/STAT 335.

STAT 404 Statistical Computing
Credits 3. 3 Lecture Hours.
Statistical programming in R and Python; random number generation; design of simulation studies; interactive and dynamic statistical graphics; parallel computing in statistics; statistical and machine learning algorithms.
Prerequisites: STAT 212; junior or senior classification or approval of instructor.

STAT 406 Design and Analysis of Experiments
Credits 3. 3 Lecture Hours.
Design fundamentals; completely randomized designs; blocking; factorial, nested, nested-factorial designs; incomplete designs; fractional factorial designs; confounding; general mixed factorials; split pilot; analysis of covariance; crossover designs; power analysis, sample size determination.
Prerequisite: STAT 212; STAT 408.

STAT 407 Principles of Sample Surveys
Credits 3. 3 Lecture Hours.
Principles of sample surveys and survey design; techniques for variance reduction; simple, stratified and multi-stage sampling; ratio and regression estimates; post-stratification; equal and unequal probability sampling.
Prerequisite: STAT 212.
STAT 408 Introduction to Linear Models  
Credits 3. 3 Lecture Hours.  
Introduction to the formulation of linear models and the estimation of the parameters of such models, with primary emphasis on least squares. Application to multiple regression and curve fitting.  
Prerequisites: STAT 212; MATH 304 or MATH 323.

STAT 414 Mathematical Statistics I  
Credits 3. 3 Lecture Hours.  
Mathematical theory of statistics; probability, random variables and their distributions, transformations of random variables, expectations and variance, generating functions, sampling distributions and basic limit theorems.  
Prerequisite: MATH 221, MATH 251 or MATH 253.

STAT 421/CSCE 421 Machine Learning  
Credits 3. 3 Lecture Hours.  
Theoretical foundations of machine learning, pattern recognition and generating predictive models and classifiers from data; includes methods for supervised and unsupervised learning (decision trees, linear discriminants, neural networks, Gaussian models, non-parametric models, clustering, dimensionality reduction, deep learning), optimization procedures and statistical inference.  
Prerequisites: Grade of C or better in MATH 304 and STAT 211; grade of C or better in CSCE 221 or STAT 404.  
Cross Listing: CSCE 421/STAT 421.

STAT 426 Methods in Time Series Analysis  
Credits 3. 3 Lecture Hours.  
Autocorrelation and spectral characteristics of univariate, autoregressive and moving average models; identification, estimation and forecasting.  
Prerequisites: STAT 408; STAT 414 or approval of instructor.

STAT 436 Multivariate Analysis and Statistical Learning  
Credits 3. 3 Lecture Hours.  
Matrix algebra; random vectors; multivariate distributions; copulas; multivariate generalizations of classical testing; principle component analysis; discriminant analysis; clustering; multidimensional scaling; factor analysis; canonical analysis.  
Prerequisites: MATH 304 or MATH 323; STAT 212; STAT 415 or equivalent.

STAT 438 Bayesian Statistics  
Credits 3. 3 Lecture Hours.  
Analysis of scalar and vector-valued parameters; Bayesian linear models; Monte Carlo computational methods; prior elicitation; hypothesis testing and model selection; hierarchical models; selected advanced models; use of statistical packages such as WinBUGS, R or MATLAB.  
Prerequisites: MATH 221; STAT 408 or equivalent.

STAT 445 Applied Biostatistics and Data Analysis  
Credits 3. 3 Lecture Hours.  
Applications of regression methods in biostatistics; correlated data analysis; survival analysis; missing data techniques; use of the R programming language.  
Prerequisites: STAT 212; STAT 408 or approval of instructor.

STAT 446 Statistical Bioinformatics  
Credits 3. 3 Lecture Hours.  
Analysis of high-dimensional genomic and proteomic data using R; sequence analysis; genome-wide association studies; proteomics; array-based technologies; classification techniques.  
Prerequisites: STAT 212; STAT 408 or approval of instructor.

STAT 459 Categorical Data Analysis  
Credits 3. 3 Lecture Hours.  
Techniques for the analysis of categorical data; contingency table analysis; logistic regression; Poisson regression; loglinear models; analysis of ordinal data; use of computer software such as SAS or R.  
Prerequisite: STAT 212; STAT 408 or equivalent.

STAT 482 Statistics Capstone  
Credits 3. 3 Lecture Hours.  
Integration of statistical models, design, sampling, graphics and computing for the analysis of real problems; planning, drafting, revising and editing reports; ethics; principles of collaboration and communication.  
Prerequisites: STAT 404; STAT 406; STAT 408 and senior classification.

STAT 484 Internship  
Credits 0 to 3. 0 to 3 Other Hours.  
Directed internship in an organization to provide on-the-job training and applied research experience with professionals in settings appropriate to statistics and student professional interest.  
Prerequisites: Major in statistics; 12 completed hours of statistics; 2.5 cumulative GPA; 2.5 GPA in statistics courses; approval of statistics undergraduate advisor.

STAT 485 Directed Studies  
Credits 1 to 6. 1 to 6 Other Hours.  
Special problems in statistics not covered by another course in the curriculum. Work may be in either theory or methodology.  
Prerequisite: Approval of instructor.

STAT 489 Special Topics in...  
Credits 1 to 4. 1 to 4 Lecture Hours.  
Selected topics in an identified area of statistics. May be repeated for credit.  
Prerequisite: Junior or senior classification or approval of department head.

STAT 491 Research  
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.  
Research conducted under the direction of faculty members in statistics. May be taken four times for credit. Registration in multiple sections of this course is possible within a given semester provided that the per semester credit hour limit is not exceeded.  
Prerequisite: Junior or senior classification or approval of instructor.