STAT - STATISTICS (STAT)

STAT 182 Foundations of Statistics
Credit 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 or BUSN 203; STAT 301, STAT 302, STAT 303. Prerequisite: MATH 147 or equivalent; junior or senior classification.

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. Only one of the following will satisfy the requirements for a degree: STAT 201 or BUSN 203; STAT 301, STAT 302, STAT 303.

STAT 202 Principles of Statistics I
Credits 3. 3 Lecture Hours. Statistical methods for biological science majors. Concepts of population and sample; the organization of a sample survey; questionnaire design. Basic survey designs and computation of estimates and variances. Prerequisite: STAT 201 or STAT 302 or STAT 303 or BUSN 203.

STAT 203 Principles of Statistics II
Credits 3. 3 Lecture Hours. Statistical methods for biological science majors. Concepts of population and sample; the organization of a sample survey; questionnaire design. Basic survey designs and computation of estimates and variances. Prerequisite: STAT 201 or STAT 302 or STAT 303 or BUSN 203.

STAT 204 Statistical Computing
Credits 3. 3 Lecture Hours. Statistical computing using R programming language. Emphasis on hands-on experience with R to learn and apply statistical methods. Cross Listing: CSCE 320/ECEN 360.

STAT 205 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 or BUSN 203; STAT 301, STAT 302, STAT 303. Prerequisite: STAT 201.

STAT 206 Statistical Methods
Credits 3. 3 Lecture Hours. Statistical methods for biological science majors. Concepts of population and sample; the organization of a sample survey; questionnaire design. Basic survey designs and computation of estimates and variances. Prerequisite: STAT 201 or STAT 302 or STAT 303 or BUSN 203.

STAT 207 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 201 or STAT 302 or STAT 303 or BUSN 203.

STAT 208 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 201.

STAT 209 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 201; 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 415 Mathematical Statistics II
Credits 3. 3 Lecture Hours. Continuation of the mathematical theory of statistics, including principles for statistical inference, formulation of statistical models, reduction of data, point estimation, confidence intervals, hypothesis testing and Bayesian inference. Prerequisite: STAT 414 or MATH 411.

STAT 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. Prerequisite: Grade of C or better in MATH 304, MATH 311, or MATH 323; Grade of C or better in STAT 211, and STAT 404 or CSCE 221, or ECEN 303, and CSCE 121 or CSCE 120. Cross Listing: CSCE 421 and ECEN 427.

STAT 424/MATH 424 Probability and Computing
Credits 3. 3 Lecture Hours. Applications of modern probability in data science, with an emphasis on randomization and the role of probabilistic techniques in computing; discrete random variables and expectation; deviation inequalities and applications to randomized algorithms; probabilistic methods and satisfiability; Monte Carlo method; sample complexity; combinatorial dimension. Prerequisites: MATH 304, MATH 309, MATH 311, or MATH 323; MATH 411 or STAT 414. Cross Listing: MATH 424/STAT 424.

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.

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.

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.

STAT 449 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 408 and senior classification.

STAT 483 Interdisciplinary Data Analytics Practicum
Credits 3. 3 Lecture Hours. Application of data analytic methods and technologies in domain-based problems with real-world data; use of relevant machine learning platforms and open source tools; organization of project activities to meet goals; written and oral communication skills and methods for effective collaboration in teams with members drawn from varied technical disciplines. Prerequisite: STAT 404, ISTM 313, ISTM 315, PETE 404, GEOP 361, CSCE 310, or CSCE 314; STAT 408, SCMT 305, ECEN 360, STAT 315, CSCE 305, GEOL 360, CSCE 305, CSCE 320/STAT 335, or STAT 335; STAT 436, STAT 421, CSCE 421, ISTM 360, or PETE 419.

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...
STAT 491 Research

Credits 0 to 4. 0 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.