DEPARTMENT OF STATISTICS

Courses

Subjects in this department include: Applied Statistics (STAA), Applied Statistics for Researchers (STAR) and Statistics (STAT).

Applied Statistics (STAA)

STAA 551 Regression Models and Applications Credits: 2 (2-0-0)
Course Description: Model estimation and goodness of fit for linear models; confidence intervals for prediction and estimation; lack of fit, model diagnostics, transformations, model selection, influential observations, collinearity, interaction, weighted least squares, imputation.

Prerequisite: MATH 369 and STAT 315.
Restriction: Must be a: Graduate.
Registration Information: Admission to the Master of Applied Statistics or admission to the Graduate Certificate in Theory and Applications of Regression Models. Written consent of instructor. This is a partial semester course. Sections may be offered: Online.
Term Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: No.

STAA 552 Generalized Regression Models Credits: 2 (2-0-0)
Course Description: Categorical data analysis, estimation and testing for contingency tables, introduction to generalized linear models, logit and probit models for binary regression, extensions to nominal and ordinal multicategory responses, count data, Poisson and negative binomial regression, log-linear models.
Prerequisite: STAA 551, may be taken concurrently or STAR 512 or STAT 512 or STAT 540.
Registration Information: Written consent of instructor. This is a partial semester course. Sections may be offered: Online.
Term Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: No.

STAA 553 Experimental Design Credits: 2 (2-0-0)
Course Description: Analysis of variance, covariance, randomized block, latin square, factorial, balanced and unbalanced designs. Applications to agriculture, biosciences. Implementation in SAS and R.
Prerequisite: (STAA 551 or STAT 540) and (STAA 562 or STAT 530).
Restriction: Must be a: Graduate.
Registration Information: Graduate standing. Written consent of instructor. This is a partial semester course. Sections may be offered: Online.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

STAA 554 Mixed Models Credits: 2 (2-0-0)
Course Description: Topics in linear models that have both fixed and random predictors: split-plot and related designs, mixed-effects factorials, repeated measures, random coefficients, and spatial models for designed experiments. Introduction to generalized linear and nonlinear mixed models. Statistical topics will be integrated with implementation in SAS and R.
Prerequisite: STAA 552.
Restriction: Must be a: Graduate.
Registration Information: Graduate standing. Must have concurrent registration in STAA 553. Written consent of instructor. This is a partial semester course. Sections may be offered: Online.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

STAA 555 Statistical Consulting Skills Credit: 1 (1-0-0)
Also Offered As: STAT 555.
Course Description: Skills necessary to collaborate with non-statisticians. Communicate both verbally and in writing with collaborators while honing in on study objectives and identifying measures and factors. Readings of selected papers and texts and mock client sessions and shadowing. Common statistical tools necessary for statistical consulting will be reviewed.
Prerequisite: None.
Restriction: Must be a: Graduate.
Registration Information: Graduate standing. Sections may be offered online. Credit not allowed for both STAA 555 and STAT 555.
Term Offered: Fall.
Grade Mode: Instructor Option.
Special Course Fee: No.

STAA 556 Statistical Consulting Credits: 2 (2-0-0)
Course Description: Effective consulting to meet with clients, analyze real data, and prepare reports.
Prerequisite: STAA 500 to 599 - at least 28 credits.
Registration Information: Written consent of instructor. This is a partial semester course. Sections may be offered: Online.
Term Offered: Summer.
Grade Mode: Traditional.
Special Course Fee: No.

STAA 561 Probability with Applications Credits: 2 (2-0-0)
Course Description: Random variables, continuous and discrete distributions, expectations, joint and conditional distributions, moments and moment generating functions, transformations, order statistics.
Prerequisite: MATH 369 or STAT 315.
Restriction: Must be a: Graduate.
Registration Information: Admission to the Master of Applied Statistics or admission to the Graduate Certificate in Theory and Applications of Regression Models. Written consent of instructor. This is a partial semester course. Sections may be offered: Online.
Term Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: No.

STAA 562 Mathematical Statistics with Applications Credits: 2 (2-0-0)
Course Description: Theory and applications of estimations, testing, and confidence intervals. Computer simulations, sampling from the normal distribution.
Prerequisite: STAA 561, may be taken concurrently or STAT 520.
Registration Information: Written consent of instructor. This is a partial-semester course.
Term Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: No.

STAA 565 Quantitative Reasoning Credit: 1 (1-0-0)
Course Description: Confounding, types of bias such as selection bias and regression effect bias, Simpson's paradox, experiments versus observational studies.
Prerequisite: STAA 551 or STAR 512, may be taken concurrently or STAT 512.
Restriction: Must be a: Graduate.
Registration Information: Graduate standing. This is a partial semester course. Sections may be offered: Online.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

STAA 566 Data Visualization Methods Credit: 1 (1-0-0)
Course Description: Principles of effective graphs, data visualization methods, grammar of graphics, multi-panel conditioning, exploratory data analysis using graphics, 3D plotting, ROC curves, data wrangling.
Prerequisite: STAA 551, may be taken concurrently or STAR 512, may be taken concurrently or STAT 512.
Restriction: Must be a: Graduate.
Registration Information: Admission to Master of Applied Statistics program or Graduate Certificate in Data Analysis. This is a partial semester course. Sections may be offered: Online.
Term Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: No.

STAA 567 Computational and Simulation Methods Credit: 1 (1-0-0)
Course Description: Statistical computation and simulation methods used to estimate probability distribution of non-standard test statistics, find estimators, test hypotheses, and compute confidence intervals. Optimization, bootstrapping, pivoting techniques.
Prerequisite: (STAA 551, may be taken concurrently or STAT 512, may be taken concurrently or STAT 540, may be taken concurrently) and (STAA 561, may be taken concurrently or STAT 511A or STAT 511B or STAT 520, may be taken concurrently).
Restriction: Must be a: Graduate.
Registration Information: Graduate standing. Written consent of instructor. This is a partial semester course. Sections may be offered: Online.
Term Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: No.

STAA 568 Topics Industrial/Organizational Statistics Credit: 1 (1-0-0)
Course Description: Six Sigma techniques, DMAIC, CT trees, VOC tools, data collection, process capability, capability metrics, graphical data exploration, and process control.
Prerequisite: (STAA 553, may be taken concurrently or STAR 512, may be taken concurrently or STAT 512) and (STAA 561 or STAR 511 or STAT 511A or STAT 520).
Restriction: Must be a: Graduate.
Registration Information: Graduate standing. This is a partial semester course. Sections may be offered: Online.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

STAA 571 Survey Statistics Credits: 2 (2-0-0)
Course Description: Survey design, simple random, stratified, and cluster samples. Estimation and variance estimation.
Prerequisite: (STAA 551 or STAT 540) and (STAA 562 or STAT 530).
Registration Information: Written consent of instructor. This is a partial semester course.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

STAA 572 Nonparametric Methods Credits: 2 (2-0-0)
Course Description: Rank-based methods, nonparametric inferential techniques, scatterplot smoothing, nonparametric function estimation, environmental applications.
Prerequisite: (STAA 551, may be taken concurrently or STAR 512, may be taken concurrently or STAT 512 and STAT 540, may be taken concurrently) and (STAA 561, may be taken concurrently or STAR 511, may be taken concurrently or STAT 511A or STAT 511B or STAT 520, may be taken concurrently).
Restriction: Must be a: Graduate.
Registration Information: Graduate standing. This is a partial semester course.
Term Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: No.

STAA 573 Analysis of Time Series Credits: 2 (2-0-0)
Course Description: Exploratory analysis of time series, including periodicity and trends, moving average and auto-regressive models, estimation and forecasting. Financial and environmental applications.
Prerequisite: (STAA 551, may be taken concurrently or STAT 540, may be taken concurrently) and (STAA 561, may be taken concurrently or STAT 520, may be taken concurrently).
Restriction: Must be a: Graduate.
Registration Information: Admission to Master of Applied Statistics program or Graduate Certificate in Data Analysis; students in the Graduate Certificate in Data Analysis require permission of the instructor. This is a partial semester course. Sections may be offered: Online.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

STAA 574 Methods in Multivariate Analysis Credits: 2 (2-0-0)
Course Description: Multivariate ANOVA, principal components, factor analysis, cluster analysis, discrimination analysis.
Prerequisite: STAA 551, may be taken concurrently and STAA 561.
Registration Information: Written consent of instructor. This is a partial semester course.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

STAA 575 Applied Bayesian Statistics Credits: 2 (2-0-0)
Course Description: Bayesian analysis of statistical models, prior and posterior distributions, computing methods, interpretation.
Prerequisite: (STAA 552) and (STAA 562 or STAT 530) and (STAA 567).
Registration Information: Written consent of instructor. This is a partial semester course.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

STAA 576 Methods in Spatial Statistics Credits: 2 (2-0-0)
Course Description: Covariance estimation, covariance/variogram models, spatial regression models, spatial prediction, spatial point patterns.
Prerequisite: (STAA 552) and (STAA 561 or STAT 520).
Restriction: Must not be a: Graduate.
Registration Information: Graduate standing. Written consent of instructor. This is a partial semester course. Sections may be offered: Online.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

STAA 577 Statistical Learning and Data Mining Credits: 2 (2-0-0)
Course Description: Applications-oriented overview into how to use statistical methods to do data mining, inference, and prediction.
Prerequisite: STAA 551, may be taken concurrently and STAA 561.
Registration Information: This is a partial semester course. Sections may be offered: Online.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

STAA 578 Machine Learning Credits: 2 (2-0-0)
Course Description: K-means clustering, perceptron algorithm, evaluating model performance, neural networks, learning theory and dimension reduction.
Prerequisite: STAA 577, may be taken concurrently.
Restriction: Must be a: Graduate.
Registration Information: Graduate standing. This is a partial semester course. Sections may be offered: Online. Credit not allowed for both CS 545 and STAA 578.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

Applied Statistics for Researchers (STAR)

STAR 501 Data Wrangling/Visualization for Researchers Credits: 2 (2-0-0)
Course Description: Data manipulation in R, importing and exporting data, variable transformation, converting dataset formats, generating summary statistics, principles of effective graphs, data visualization methods, exploratory data analysis using graphics, multi-panel plotting, high-density plotting, 3D plotting.
Prerequisite: STAR 511 or STAT 511A or STAT 511B.
Restriction: Must be a: Graduate.
Registration Information: Does not apply to Master of Applied Statistics program. Sections may be offered: Online. Credit not allowed for both STAR 501 and STAT 580A3.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

STAR 502 Multivariate Analysis for Researchers Credits: 2 (2-0-0)
Course Description: Multivariate ANOVA, principal components, factor analysis, cluster analysis, discriminant analysis.
Prerequisite: STAR 511 or STAT 511A or STAT 511B.
Restriction: Must be a: Graduate.
Registration Information: Does not apply to Master of Applied Statistics program. Sections may be offered: Online. Credit not allowed for both STAR 502 and STAT 581A4.
Term Offered: Fall (odd years).
Grade Mode: Traditional.
Special Course Fee: No.

STAR 511 Design and Data Analysis for Researchers I Credits: 4 (3-0-1)
Course Description: Statistical methods for experimenters and researchers emphasizing design and analysis of experiments.
Prerequisite: STAT 301 or STAT 307 or STAT 311 or STAT 315.
Registration Information: Must register for lecture and recitation. Sections may be offered: Online. Credit not allowed for both STAR 511 and STAT 511A. Credit not allowed for both STAR 511 and STAT 511B.
Terms Offered: Fall, Spring, Summer.
Grade Modes: S/U within Student Option, Trad within Student Option.
Special Course Fee: No.

STAR 512 Design and Data Analysis for Researchers II Credits: 4 (3-0-1)
Course Description: Statistical methods for experimenters and researchers emphasizing design and analysis of experiments.
Prerequisite: STAR 511 or STAT 511A.
Registration Information: Must register for lecture and recitation. Sections may be offered: Online. Credit not allowed for both STAR 512 and STAT 512.
Term Offered: Spring.
Grade Modes: S/U within Student Option, Trad within Student Option.
Special Course Fee: No.

STAR 513 Regression Models for Researchers Credits: 2 (2-0-0)
Course Description: Model estimation and goodness of fit for linear models; confidence intervals for prediction and estimation; lack of fit, model diagnostics, transformations, model selection, influential observations, collinearity, interaction, polynomial regression, regression with dummy variables,weighted least squares, imputation.
Prerequisite: STAR 511 or STAT 511A or STAT 511B.
Restriction: Must be a: Graduate.
Registration Information: Does not apply to Master of Applied Statistics program. Sections may be offered: Online. Credit not allowed for both STAR 513 and STAT 581A3.
Term Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: No.

STAR 514 Experimental Design/Analysis for Researchers Credits: 2 (2-0-0)
Course Description: Analysis of variance, covariance, randomized block, latin square, factorial, balanced and unbalanced designs. Applications to agriculture, biosciences. Implementation in R and JMP.
Prerequisite: STAR 511 or STAT 511A or STAT 511B.
Restriction: Must be a: Graduate.
Registration Information: Sections may be offered: Online. Credit not allowed for both STAR 514 and STAT 580A4.
Term Offered: Spring (even years).
Grade Mode: Traditional.
Special Course Fee: No.

STAR 531 Generalized Regression Models for Researchers Credits: 2 (2-0-0)
Course Description: Categorical data analysis, estimation and testing for contingency tables, introduction to generalized linear models, logit and probit models for binary regression, extensions to nominal and ordinal multicategory responses, count data, Poisson and negative binomial regression, log-linear models.
Prerequisite: STAR 512 or STAR 513 or STAT 512.
Restriction: Must be a: Graduate.
Registration Information: Does not apply to Master of Applied Statistics program. Sections may be offered: Online. Credit not allowed for both STAR 531 and STAT 581A5.
Term Offered: Spring (even years).
Grade Mode: Traditional.
Special Course Fee: No.

STAR 532 Mixed Models for Researchers Credits: 2 (2-0-0)
Course Description: Topics in linear models that have both fixed and random predictors: split-plot and related designs, mixed-effects factorials, repeated measures, random coefficients, and spatial models for designed experiments. Introduction to generalized linear and nonlinear mixed models.
Prerequisite: STAR 512 or STAR 514 or STAT 512.
Restriction: Must be a: Graduate.
Registration Information: Does not apply to Master of Applied Statistics program. Sections may be offered: Online.
Term Offered: Fall (even years).
Grade Mode: Traditional.
Special Course Fee: No.

STAR 534 Machine Learning for Researchers Credits: 2 (2-0-0)
Course Description: K-means clustering, perceptron algorithm, evaluating model performance, neural networks, learning theory and dimension reduction.
Prerequisite: STAR 512 or STAR 513 or STAT 512.
Restriction: Must be a: Graduate.
Registration Information: Does not apply to Master of Applied Statistics program. Sections may be offered: Online.
Term Offered: Fall (even years).
Grade Mode: Traditional.
Special Course Fee: No.

STAR 695 Independent Study in Applied Statistics Credits: Var[1-3] (0-0-0)
Course Description: Application of statistics to a student's specific research, guided by a statistician. Intended for students who are not in the Statistics department.
Prerequisite: STAR 511 or STAT 511A or STAT 511B.
Restriction: Must be a: Graduate, Professional.
Registration Information: Written consent of instructor. Credit not allowed for both STAR 695 and STAT 681A1.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Traditional.
Special Course Fee: No.

Statistics (STAT)

STAT 100 Statistical Literacy (GT-MA1) Credits: 3 (2-0-1)
Course Description: Learn to be an intelligent consumer of statistical information. Concepts of randomness and probability, variation, types of measurement, errors in measurement, experiments versus observational studies, Simpson's paradox, biases in statistical studies, p-value.
Prerequisite: None.
Restriction: Must be a: Undergraduate.
Registration Information: Must register for lecture and recitation. Sections may be offered: Online.
Term Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: No.
Additional Information: 1B, Mathematics (GT-MA1).

STAT 158 Introduction to R Programming Credit: 1 (1-0-0)
Course Description: Programming using the R Project for the Statistical Computing. Data objects, for loops, if statements, using packages.
Prerequisite: None.
Terms Offered: Spring, Summer.
Grade Mode: Traditional.
Special Course Fee: No.

STAT 192 First-Year Seminar in Statistics Credit: 1 (0-0-1)
Course Description: Explore careers in statistics and the variety of problems encountered by statisticians.
Prerequisite: None.
Term Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: No.

STAT 201 General Statistics (GT-MA1) Credits: 3 (2-0-1)
Course Description: Graphs, descriptive statistics, confidence intervals, hypothesis tests, correlation and simple regression, tests of association. Use JMP software to analyze data.
Prerequisite: None.
Registration Information: Must register for lecture and recitation. Sections may be offered: Online. Credit not allowed for both STAT 201 and STAT 204.
Terms Offered: Fall, Spring, Summer.
Grade Modes: S/U within Student Option, Trad within Student Option.
Special Course Fee: No.
Additional Information: 1B, Mathematics (GT-MA1).

STAT 204 Statistics With Business Applications (GT-MA1) Credits: 3 (2-0-1)
Course Description: Statistical methods in business; descriptive methods, simple probability, sampling distributions, confidence intervals, hypothesis testing, correlation, simple and multiple regression, practical concerns in inference. Use Excel software to analyze data.
Prerequisite: None.
Registration Information: Must register for lecture and recitation. Sections may be offered: Online. Credit not allowed for both STAT 201 and STAT 204.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Traditional.
Special Course Fee: No.
Additional Information: 1B, Mathematics (GT-MA1).

STAT 258 Advanced R Programming Credits: 2 (2-0-0)
Course Description: Advanced R programming skills for statisticians and data scientists. Topics include coding best practices and debugging; R packages for wrangling complex data structures; application programming interfaces (APIs), scraping data from the web; developing interactive graphics, web applications, and maps; literate programming documents, scalability in R; R package development, parallelization.
Prerequisite: STAT 158.
Registration Information: Sections may be offered: Online.
Terms Offered: Spring, Summer.
Grade Mode: Traditional.
Special Course Fee: No.

STAT 301 Introduction to Applied Statistical Methods Credits: 3 (3-0-0)
Course Description: Statistical methods in science; descriptive methods, simple probability, sampling distributions, confidence intervals, hypothesis testing, statistical power, one-way ANOVA, correlation, simple and multiple regression, interaction, practical concerns in inference (e.g. interpreting p-values, publication bias), reading and evaluating statistical results in published papers and popular media. Emphasis on using software rather than hand calculation to conduct analyses.
Prerequisite: MATH 117 or MATH 118 or MATH 120 or MATH 124 or MATH 125 or MATH 126 or MATH 127 or MATH 141 or MATH 155 or MATH 159 or MATH 160.
Registration Information: Sections may be offered: Online. Credit allowed for only one of the following: STAT 301, STAT 302A, STAT 307, or STAT 311.
Terms Offered: Fall, Spring, Summer.
Grade Modes: S/U within Student Option, Trad within Student Option, Traditional.
Special Course Fee: No.

STAT 302A Statistics Supplement: General Applications Credit: 1 (1-0-0)
Course Description: Statistical power, one-way ANOVA, and multiple regression with indicator variables and interaction.
Prerequisite: STAT 201 with a minimum grade of B or STAT 204 with a minimum grade of B.
Registration Information: Credit allowed for only one of the following: STAT 301, STAT 302A, or STAT 381A1.
Terms Offered: Fall, Spring.
Grade Mode: Traditional.
Special Course Fee: No.

STAT 303 Introduction to Communications Principles Credits: 3 (3-0-0)
Also Offered As: ECE 303.
Course Description: Basic concepts in design and analysis of communication systems.
Prerequisite: MATH 340, may be taken concurrently and MATH 261 with a minimum grade of C.
Registration Information: Sections may be offered: Online. Credit not allowed for both ECE 303 and STAT 303.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

STAT 305 Sampling Techniques Credits: 3 (3-0-0)
Course Description: Sample designs: simple random, stratified, systematic, cluster, unequal probability, two-phase; methods of estimation and sample size determination.
Prerequisite: STAT 301 or STAT 307 or ERHS 307 or STAT 311 or STAT 315.
Term Offered: Fall.
Grade Modes: S/U within Student Option, Trad within Student Option.
Special Course Fee: No.

STAT 307 Introduction to Biostatistics Credits: 3 (3-0-0)
Course Description: Biostatistical methods; confidence intervals, hypothesis tests, simple correlation and regression, one-way analysis of variance.
Prerequisite: MATH 117 or MATH 118 or MATH 120 or MATH 124 or MATH 125 or MATH 126 or MATH 127 or MATH 141 or MATH 155 or MATH 160.
Registration Information: Credit allowed for only one of the following: STAT 301, STAT 307, or STAT 311.
Terms Offered: Fall, Spring, Summer.
Grade Modes: S/U within Student Option, Trad within Student Option.
Special Course Fee: No.

STAT 315 Intro to Theory and Practice of Statistics Credits: 3 (3-0-0)
Course Description: Descriptive statistics, probability theory, random variables, sampling distributions, hypothesis testing, confidence intervals, ANOVA, simple and multiple regression. R software is utilized for analyzing real world data sets.
Prerequisite: MATH 155 or MATH 156 or MATH 159 or MATH 160.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Traditional.
Special Course Fee: No.

STAT 316 Games and Gambling Credit: 1 (1-0-0)
Course Description: Application of probability concepts to games of chance and gambling contests.
Prerequisite: STAT 315.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

STAT 331 Intermediate Applied Statistical Methods Credits: 3 (3-0-0)
Course Description: Covers applied regression methods, including: interaction; model assumptions and diagnostics, selection, and validation; penalized estimation; GLMs; mixed models; factorial ANOVA; ANCOVA. Also covers basic categorical data analysis and non-parametrics. Strong emphasis on application and interpretation; lesser emphasis on mathematics. Assignments involve reproducing analyses in published scientific papers and open ended data analysis projects. Data analyses are performed using JMP software.
Prerequisite: STAT 301 or STAT 302A or STAT 307 or STAT 315.
Registration Information: Credit not allowed for both STAT 331 and STAT 380A1.
Term Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: No.

STAT 341 Statistical Data Analysis I Credits: 3 (3-0-0)
Course Description: Estimation and inference based upon Gaussian linear regression models; residual analysis; variable selection; non-linear regression.
Prerequisite: (STAT 158) and (STAT 301 or STAT 307 or STAT 311 or STAT 315).
Term Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: No.

STAT 342 Statistical Data Analysis II Credits: 3 (3-0-0)
Course Description: Single-factor analysis of variance models; multi-factor analysis of variance models; randomized block design; Latin squares; split-plot design.
Prerequisite: STAT 340 or STAT 341.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

STAT 351 Sports Statistics and Analytics I Credits: 3 (3-0-0)
Course Description: Statistical methodology for sports data with emphasis on the unique aspects of analyzing sports data. Topics include summary statistics, probability, simulation, and statistical inference for sports data.
Prerequisite: (STAT 158) and (STAT 201 or STAT 204 or STAT 301 or STAT 307 or STAT 315).
Registration Information: Sections may be offered: Online. Credit not allowed for both STAT 351 and STAT 381A2.
Term Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: No.

STAT 358 Introduction to Statistical Computing in SAS Credits: 2 (2-0-0)
Course Description: Statistical procedures and database operations using the SAS programming language.
Prerequisite: STAT 315 or STAT 341.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

STAT 384 Supervised College Teaching Credits: Var[1-3] (0-0-0)
Course Description: Participation as a statistics tutor.
Prerequisite: STAT 341.
Restriction: Must not be a: Freshman.
Registration Information: Sophomore standing. Written consent of advisor. A maximum of 10 combined credits for all 384 and 484 courses are counted toward graduation requirements.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Traditional.
Special Course Fee: No.

STAT 400 Statistical Computing Credits: 3 (3-0-0)
Course Description: Computationally intensive statistical methods: optimization for statistical problems; simulation & Monte Carlo methods; resampling methods; smoothing.
Prerequisite: (CS 150 or CS 152 or CS 163 or CS 164) and (STAT 420, may be taken concurrently).
Term Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: No.

STAT 402 Principles of Probability Credits: 3 (3-0-0)
Course Description: Fundamental concepts of probability explained via simulations and numerical computations. Discrete and continuous random variables, distribution functions, expectations and variances; joint and conditional distributions; large-sample approximations.
Prerequisite: (MATH 117) and (MATH 118) and (MATH 124) and (STAT 158) and (STAT 301 or STAT 307 or STAT 315).
Term Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: No.

STAT 403 Principles of Statistical Inference Credits: 3 (3-0-0)
Course Description: Methods and applications of point estimation, confidence intervals, and hypothesis testing; one-sample, two-sample, and k-sample problems; sampling distributions including normal, t, chi-squared, and F.
Prerequisite: STAT 402.
Registration Information: Sections may be offered: Online.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

STAT 420 Probability and Mathematical Statistics I Credits: 3 (3-0-0)
Course Description: Discrete probabilities, discrete and continuous random variables, distribution functions and densities, expectations and moments; joint and conditional distributions; transformations, moment generating function, and central limit theorem.
Prerequisite: MATH 255 or MATH 256 or MATH 261.
Term Offered: Fall.
Grade Modes: S/U within Student Option, Trad within Student Option.
Special Course Fee: No.

STAT 421 Introduction to Stochastic Processes Credits: 3 (3-0-0)
Course Description: Modeling phenomena with stochastic processes and the simulation and analysis of stochastic process models.
Prerequisite: (MATH 269 or MATH 369) and (STAT 420).
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

STAT 430 Probability and Mathematical Statistics II Credits: 3 (3-0-0)
Course Description: Theories and applications of estimation, testing, and confidence intervals, sampling distributions including normal, gamma, beta X-squared, t, and F.
Prerequisite: STAT 420.
Term Offered: Spring.
Grade Modes: S/U within Student Option, Trad within Student Option.
Special Course Fee: No.

STAT 440 Bayesian Data Analysis Credits: 3 (3-0-0)
Course Description: Applied Bayesian data analysis, Bayesian inference and interpretation of results, computing methods including MCMC, model selection and evaluation.
Prerequisite: (STAT 315 or STAT 420) and (STAT 341).
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

STAT 451 Sports Statistics and Analytics II Credits: 3 (3-0-0)
Course Description: Introduction to data collection, data management, data visualization, statistical and machine learning methods related to exploratory and predictive analysis of sports data. Real world examples from baseball, football, basketball, hockey, and soccer are covered.
Prerequisite: STAT 351.
Registration Information: Sections may be offered: Online. Credit not allowed for both STAT 380A2 and STAT 451.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

STAT 460 Applied Multivariate Analysis Credits: 3 (3-0-0)
Course Description: Principles for multivariate estimation and testing; multivariate analysis of variance, discriminant analysis; principal components, factor analysis.
Prerequisite: (STAT 341) and (DSCI 269 or DSCI 369 or MATH 229 or MATH 269 or MATH 340 or MATH 369).
Term Offered: Spring.
Grade Modes: S/U within Student Option, Trad within Student Option.
Special Course Fee: No.

STAT 472 Statistical Research--Design, Data, Methods Credits: 3 (0-0-3)
Course Description: Statistical research skills including data analysis, problem solving, report writing, oral communication, and planning experiments.
Prerequisite: STAT 342.
Restriction: Must be a: Undergraduate.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

STAT 495 Independent Study Credits: Var[1-18] (0-0-0)
Course Description:
Prerequisite: None.
Registration Information: Written consent of instructor.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Instructor Option.
Special Course Fee: No.

STAT 498 Undergraduate Research in Statistics Credits: Var[1-3] (0-0-0)
Course Description: Research skills and techniques; includes both oral and written communication of results.
Prerequisite: None.
Registration Information: Written consent of instructor.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Instructor Option.
Special Course Fee: No.

STAT 500 Statistical Computer Packages Credit: 1 (0-2-0)
Course Description: Comparison, evaluation, and use of computer packages for univariate and multivariate statistical analyses.
Prerequisite: None.
Restriction: Must be a: Graduate.
Registration Information: Admission to the Master of Applied Statistics program or Theory and Applications of Regression Models certificate program. This is a partial semester course. Sections may be offered: Online.
Term Offered: Summer.
Grade Modes: S/U within Student Option, Trad within Student Option.
Special Course Fee: No.

STAT 501 Statistical Science Credit: 1 (1-0-0)
Course Description: Overview of statistics theory; use in agriculture, business, environment, engineering; modeling; computing; statisticians as researchers/consultants.
Prerequisite: None.
Term Offered: Fall.
Grade Mode: S/U Sat/Unsat Only.
Special Course Fee: No.

STAT 520 Introduction to Probability Theory Credits: 4 (4-0-0)
Course Description: Probability, random variables, distributions, expectations, generating functions, limit theorems, convergence, random processes.
Prerequisite: MATH 369 and MATH 261 and MATH 317.
Term Offered: Fall.
Grade Modes: S/U within Student Option, Trad within Student Option.
Special Course Fee: No.

STAT 521 Stochastic Processes I Credits: 3 (3-0-0)
Course Description: Characterization of stochastic processes. Markov chains in discrete and continuous time, branching processes, renewal theory, Brownian motion.
Prerequisite: STAT 520.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

STAT 523 Quantitative Spatial Analysis Credits: 3 (3-0-0)
Also Offered As: NR 523.
Course Description: Techniques in spatial analysis: point pattern analysis, spatial autocorrelation, trend surface and spectral analysis.
Prerequisite: ERHS 307 or STAT 301 or STAT 307.
Registration Information: Credit not allowed for both NR 523 and STAT 523.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

STAT 524 Financial Statistics Credits: 3 (3-0-0)
Also Offered As: FIN 524.
Course Description: Probability and statistical concepts and quantitative tools used in financial modeling and decision-making.
Prerequisite: MATH 345 and STAT 420.
Registration Information: Admission to MSBA program with Financial Risk Management specialization can substitute for MATH 345. Credit not allowed for both FIN 524 and STAT 524. Sections may be offered: Online.
Term Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: No.

STAT 525 Analysis of Time Series I Credits: 3 (3-0-0)
Course Description: Trend and seasonality, stationary processes, Hilbert space techniques, spectral distribution function, fitting ARIMA models, linear prediction.
Prerequisite: STAT 430.
Term Offered: Fall.
Grade Modes: S/U within Student Option, Trad within Student Option.
Special Course Fee: No.

STAT 530 Mathematical Statistics Credits: 3 (3-0-0)
Course Description: Sampling distributions, estimates, testing, confidence intervals, exact and asymptotic theories of maximum likelihood and distribution-free methods.
Prerequisite: STAT 520.
Term Offered: Spring.
Grade Modes: S/U within Student Option, Trad within Student Option.
Special Course Fee: No.

STAT 540 Data Analysis and Regression Credits: 3 (3-0-0)
Course Description: Introduction to multiple regression and data analysis with emphasis on graphics and computing.
Prerequisite: STAT 300 to 481 - at least 6 credits.
Term Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: No.

STAT 544 Biostatistical Methods for Quantitative Data Credits: 3 (3-0-0)
Also Offered As: ERHS 544.
Course Description: Regression and analysis of variance methods applied to both observational studies and designed experiments in the biological sciences.
Prerequisite: STAT 301 or STAT 307 or ERHS 307.
Registration Information: Credit not allowed for both STAT 544 and ERHS 544.
Term Offered: Spring.
Grade Modes: S/U within Student Option, Trad within Student Option.
Special Course Fee: No.

STAT 547 Statistics for Environmental Monitoring Credits: 3 (3-0-0)
Also Offered As: CIVE 547.
Course Description: Applications of statistics in environmental pollution studies involving air, water, or soil monitoring; sampling designs; trend analysis; censored data.
Prerequisite: STAT 301.
Registration Information: Credit not allowed for both STAT 547 and CIVE 547. Sections may be offered: Online.
Term Offered: Spring.
Grade Modes: S/U within Student Option, Trad within Student Option.
Special Course Fee: No.

STAT 555 Statistical Consulting Skills Credit: 1 (1-0-0)
Also Offered As: STAA 555.
Course Description: Skills necessary to collaborate with non-statisticians. Communicate both verbally and in writing with collaborators while honing in on study objectives and identifying measures and factors. Readings of selected papers and texts and mock client sessions and shadowing. Common statistical tools necessary for statistical consulting will be reviewed.
Prerequisite: None.
Restriction: Must be a: Graduate.
Registration Information: Graduate standing. Sections may be offered online. Credit not allowed for both STAA 555 and STAT 555.
Term Offered: Fall.
Grade Mode: Instructor Option.
Special Course Fee: No.

STAT 556 Directed Statistical Consulting Credits: 2 (1-2-0)
Course Description: Skills necessary to collaborate with non-statisticians, including project management, presentation, and technical writing. Serve in the walk-in consulting lab. Collaborate on a semester-long active CSU project identified by the instructor. Engage in all phases of the long-term project.
Prerequisite: STAA 555 or STAT 555.
Restriction: Must be a: Graduate.
Registration Information: Graduate standing. Must register for lecture and laboratory.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

STAT 560 Applied Multivariate Analysis Credits: 3 (3-0-0)
Course Description: Multivariate analysis of variance; principal components; factor analysis; discriminant analysis; cluster analysis.
Prerequisite: STAT 520 and STAT 540.
Registration Information: Sections may be offered: Online.
Terms Offered: Fall, Spring.
Grade Mode: Traditional.
Special Course Fee: No.

STAT 570 Nonparametric Statistics Credits: 3 (3-0-0)
Course Description: Distribution and uses of order statistics; nonparametric inferential techniques, their uses and mathematical properties.
Prerequisite: STAT 430.
Terms Offered: Spring, Summer.
Grade Modes: S/U within Student Option, Trad within Student Option.
Special Course Fee: No.

STAT 586 Practicum in Consulting Techniques Credit: 1 (0-0-1)
Course Description: Instruction on planning studies, writing reports, and interacting with clients. Attend and critique consulting sessions.
Prerequisite: STAT 540.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Instructor Option.
Special Course Fee: No.

STAT 592 Seminar Credit: 1 (0-0-1)
Course Description:
Prerequisite: None.
Terms Offered: Fall, Spring.
Grade Mode: Instructor Option.
Special Course Fee: No.

STAT 600 Statistical Computing Credits: 3 (3-0-0)
Course Description: Optimization and integration in statistics; Monte Carlo methods; simulation; bootstrapping; density estimation; smoothing.
Prerequisite: STAT 520 and STAT 540.
Restriction: Must be a: Graduate, Professional.
Terms Offered: Fall, Spring.
Grade Mode: Traditional.
Special Course Fee: No.

STAT 604 Managerial Statistics Credits: 2 (2-0-0)
Also Offered As: BUS 604.
Course Description: Introduction to statistical thinking and methods used to support managerial decision making.
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Registration Information: Admission to the MBA program. Credit not allowed for both STAT 604 and BUS 604.
Term Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: No.

STAT 605 Theory of Sampling Techniques Credits: 3 (3-0-0)
Course Description: Survey designs; simple random, stratified, cluster samples; theory of estimation; optimization techniques for minimum variance or costs.
Prerequisite: (STAT 301 or STAT 307 or ERHS 307 or STAT 311 or STAT 315) and (STAT 430).
Restriction: Must be a: Graduate, Professional.
Term Offered: Spring.
Grade Modes: S/U within Student Option, Trad within Student Option.
Special Course Fee: No.

STAT 620 Introduction to Measure Theoretic Probability Credits: 3 (3-0-0)
Course Description: Introduction to rigorous probability theory in real Euclidean spaces based on a foundation of measure theory.
Prerequisite: STAT 520.
Restriction: Must be a: Graduate, Professional.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

STAT 623 Spatial Statistics Credits: 3 (3-0-0)
Course Description: Spatial autocorrelation, geostatistical models and kriging, analysis/modeling of point patterns, discretely-indexed spatial models.
Prerequisite: STAT 430.
Restriction: Must be a: Graduate, Professional.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

STAT 630 Advanced Statistical Data Analysis Credits: 3 (3-0-0)
Course Description: Advanced statistical modeling techniques and data analysis methods, including likelihood-based methods, M-estimation, bootstrap and EM algorithm, and other advanced topics. For example, Jackknife, permutation tests, and nonparametric statistics.
Prerequisite: STAT 530 and STAT 620 and STAT 640.
Restriction: Must be a: Graduate, Professional.
Registration Information: Credit not allowed for both STAT 630 and STAT 680A2.
Term Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: No.

STAT 640 Design and Linear Modeling I Credits: 4 (4-0-0)
Course Description: Introduction to linear models; experimental design; fixed, random, and mixed models.
Prerequisite: MATH 369 and STAT 540.
Restriction: Must be a: Graduate, Professional.
Term Offered: Spring.
Grade Modes: S/U within Student Option, Trad within Student Option.
Special Course Fee: No.

STAT 645 Categorical Data Analysis and GLIM Credits: 3 (3-0-0)
Course Description: Generalized linear models, binary and polytomous data, log linear models, quasilikelihood, survival data models.
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Registration Information: Must have concurrent registration in STAT 640.

Term Offered: Spring.
Grade Modes: S/U within Student Option, Trad within Student Option.
Special Course Fee: No.

STAT 650 Design and Linear Modeling II Credits: 3 (3-0-0)
Course Description: Mixed factorials; response surface methodology; Taguchi methods; variance components.
Prerequisite: STAT 640.
Restriction: Must be a: Graduate, Professional.
Term Offered: Fall.
Grade Modes: S/U within Student Option, Trad within Student Option.
Special Course Fee: No.

STAT 670 Bayesian Statistics Credits: 3 (3-0-0)
Course Description: Bayesian statistical theory and applications, including Markov chain Monte Carlo methods which are used to facilitate inference for more complex statistical models.
Prerequisite: STAT 530, may be taken concurrently.
Restriction: Must be a: Graduate, Professional.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

STAT 673 Hierarchical Modeling in Ecology Credits: 3 (3-0-0)
Also Offered As: FW 673.
Course Description: Hierarchical ecological modeling using common forms of data in fish and wildlife studies and emphasizing spatial and temporal aspects of analysis.
Prerequisite: ESS 575 or STAT 420.
Restriction: Must be a: Graduate, Professional.
Registration Information: Credit not allowed for both STAT 673 and FW 673.
Term Offered: Fall (odd years).
Grade Mode: Traditional.
Special Course Fee: No.

STAT 675A Topics in Statistical Methods: Sampling Credits: Var[1-3] (0-0-0)
Course Description:
Prerequisite: STAT 430.
Restriction: Must be a: Graduate, Professional.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Traditional.
Special Course Fee: No.

STAT 684 Supervised College Teaching Credits: Var[1-3] (0-0-0)
Course Description: Guidance and instruction in effective teaching of college courses in statistics.
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Registration Information: Enrollment in M.S. or Ph.D. program in statistics.
Terms Offered: Fall, Spring, Summer.
Grade Mode: S/U Sat/Unsat Only.
Special Course Fee: No.

STAT 695 Independent Study Credits: Var[1-18] (0-0-0)
Course Description:
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Instructor Option.
Special Course Fee: No.

STAT 699 Thesis Credits: Var[1-18] (0-0-0)
Course Description:
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Instructor Option.
Special Course Fee: No.

STAT 720 Probability Theory Credits: 3 (3-0-0)
Course Description: Measure theoretic probability, characteristic functions; convergence; laws of large numbers; central limit, extreme value, asymptotic theory.
Prerequisite: STAT 620.
Restriction: Must be a: Graduate, Professional.
Grade Mode: Traditional.
Special Course Fee: No.

STAT 730 Advanced Theory of Statistics I Credits: 4 (4-0-0)
Course Description: Minimal sufficiency, maximal invariance; Neyman-Pearson theory; Fisher, Kullback-Leibler information; asymptotic properties of maximum-likelihood methods.
Prerequisite: STAT 530 and STAT 720.
Restriction: Must be a: Graduate, Professional.
Term Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: No.

STAT 740 Advanced Statistical Methods Credits: 3 (3-0-0)
Course Description: Generalized additive models; recursive partitioning regression and classification; graphical models and belief networks; spatial statistics.
Prerequisite: STAT 730, may be taken concurrently.
Restriction: Must be a: Graduate, Professional.
Terms Offered: Fall, Spring.
Grade Mode: Traditional.
Special Course Fee: No.

STAT 792 Seminar Credit: 1 (0-0-1)
Course Description:
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Instructor Option.
Special Course Fee: No.

STAT 793 Seminar on Advanced Statistical Methods Credits: 3 (0-0-3)
Course Description:
Prerequisite: STAT 640.
Restriction: Must be a: Graduate, Professional.
Registration Information: Must have concurrent registration in STAT 730. May be taken up to two times for credit.
Terms Offered: Fall, Spring.
Grade Mode: Traditional.
Special Course Fee: No.

STAT 795 Independent Study Credits: Var[1-18] (0-0-0)
Course Description:
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Instructor Option.
Special Course Fee: No.

STAT 796 Group Study Credits: Var[1-18] (0-0-0)
Course Description:
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Instructor Option.
Special Course Fee: No.

STAT 799 Dissertation Credits: Var[1-18] (0-0-0)
Course Description:
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Instructor Option.
Special Course Fee: No.