Statistics (STAT)

Courses

STAT 28233. Biostatistics. 3 Hours.
An introductory course in biostatistics emphasizing methods for collecting, graphing, and understanding data. Special emphasis is placed upon available methods for both exploratory and confirmatory data analysis. Particular attention is given to statistical methods for data sets with discrete variables. Pre- or Corequisite: MATH 24004. Corequisite: Lab component. (Typically offered: Spring)

STAT 30041. Statistics Methods Laboratory. 1 Hour.
Introduction to the statistical software SAS, including its use for common statistical analyses. A practical complement to the statistical methodology covered in STAT 30043. (Typically offered: Fall and Spring)

STAT 30043. Statistical Methods. 3 Hours.
Describing Data, Basic Probability, Random variables, Uniform, Normal and Binomial Distributions, Sampling Distributions, Confidence Intervals, Hypothesis testing, Correlation and Regression, Contingency table, Comparing two populations, ANOVA. Prerequisite: MATH 24004. (Typically offered: Fall and Spring)

STAT 30133. Introduction to Probability. 3 Hours.
A calculus-based introduction to probability. Discrete probability spaces and counting techniques, discrete and continuous probability distributions, random variables, random samples, law of large numbers, central limit theorem. Prerequisite: MATH 25004. (Typically offered: Fall, Spring and Summer)
This course is cross-listed with MATH 30103.

STAT 31133. Introduction to Mathematical Statistics. 3 Hours.
A calculus-based introduction to mathematical statistics, revolving around estimation, hypothesis testing, and Bayesian inference. Emphasis is given to the unifying mathematical and decision-theoretical principles that provide a justification to different estimation and testing procedures. Prerequisite: STAT 30133 or departmental consent. (Typically offered: Spring)

STAT 40133. Statistical Forecasting and Prediction. 3 Hours.
Provides an in depth look at the theory and practice of applied modeling of temporal data for data science, including model building, selection, autocorrelation, autoregression and moving averages, and prediction for correlated data. Students will gain experience using statistical software to learn from data using applied time series and models. Prerequisite: STAT 30043 or department consent. (Typically offered: Fall)

STAT 40233. Bayesian Methods. 3 Hours.
Provides an introductory look at the theory and practice of applied Bayesian modeling for data science: including model building, selection, regularization, classification and prediction. Students will gain experience using statistical software to learn from data using applied Bayesian models. Prerequisite: STAT 30043 or department consent. (Typically offered: Spring)

STAT 40333. Nonparametric Statistical Methods. 3 Hours.
Goodness-of-fit tests, nonparametric inference in one-sample and two-sample location model, one-way and two-way ANOVA, nonparametric measures of association, Empirical distribution function, Bootstrap and Jackknife, Kernel density estimation. Prerequisite: STAT 28233 or STAT 30043 or departmental consent. (Typically offered: Fall)

STAT 40433. Sampling Techniques. 3 Hours.
Considers optimum techniques of simple random, stratified random, cluster, systematic and multistage sampling from finite populations subject to cost precision constraints. Wide range of applications. Prerequisite: STAT 30043 or department consent. (Typically offered: Fall, Spring and Summer)

STAT 4053V. Internship in Professional Practice. 1-3 Hour.
Professional work experience involving significant use of mathematics or statistics in business, industry or government. Prerequisite: Departmental consent. (Typically offered: Fall, Spring and Summer) May be repeated for up to 3 hours of degree credit.

STAT 41031. Introduction to R. 1 Hour.
A hands-on introduction to R software, a free and open-source computing environment used for data manipulation and analysis across a broad spectrum of subject areas. Intended for new users. Content begins with simple data manipulation, then complex data structures and common statistical procedures are covered. (Typically offered: Fall)

STAT 43333. Analysis of Categorical Responses. 3 Hours.
Statistical tools to analyze univariate and multivariate categorical responses. Emphasis is given to Generalized Linear Models, including logistic regression and loglinear models. Prerequisite: STAT 30043 or departmental consent. (Typically offered: Spring)

STAT 43733. Experimental Design. 3 Hours.
Topics in the design and analysis of planned experiments, including randomized block, Latin square, split plot, and BIB designs, use of fractional factorial replication, and repeated measures. Prerequisite: STAT 30043 or department consent. (Typically offered: Spring)

STAT 50131. Statistics Methods Laboratory. 1 Hour.
Introduction to the statistical software SAS, including its use for common statistical analyses. (Typically offered: Fall and Spring)

STAT 50133. Statistical Methods. 3 Hours.
Describing Data, Basic Probability, Random variables, Uniform, Normal and Binomial Distributions, Sampling Distributions, Confidence Intervals, Hypothesis testing, Correlation and Regression, Contingency table, Comparing two populations, ANOVA. (Typically offered: Fall and Spring)

STAT 50333. Nonparametric Statistical Methods. 3 Hours.
Goodness-of-fit tests, nonparametric inference in one-sample and two-sample location model, one-way and two-way ANOVA, nonparametric measures of association, Empirical distribution function, Bootstrap and Jackknife, Kernel density estimation. Graduate degree credit will not be given for both STAT 40333 and STAT 50333. Prerequisite: STAT 50133 or departmental consent. (Typically offered: Fall)

STAT 5053V. Internship in Professional Practice. 1-3 Hour.
Professional work experience involving significant use of mathematics or statistics in business, industry or government. Graduate degree credit will not be given for both STAT 4053V and STAT 5053V. Prerequisite: Departmental consent. (Typically offered: Fall, Spring and Summer) May be repeated for up to 3 hours of degree credit.

STAT 51033. Introduction to Probability Theory. 3 Hours.
Fundamentals of probability, distribution theory, and random variables; expected value, moments, and generating functions; classic parametric families of distributions; central limit theorems, inequalities, and laws of large numbers. Prerequisite: MATH 26004 and graduate standing in mathematics or statistics, or departmental consent. (Typically offered: Fall)

STAT 51133. Statistical Inference. 3 Hours.
Statistical theory of estimation and testing hypothesis. Prerequisite: STAT 51033 and graduate standing in mathematics or statistics, or departmental consent. (Typically offered: Spring)

STAT 51231. Introduction to R. 1 Hour.
A hands-on introduction to R software, a free and open-source computing environment used for data manipulation and analysis across a broad spectrum of subject areas. Intended for new users. Content begins with simple data manipulation, then complex data structures and common statistical procedures are covered. Graduate degree credit will not be given for both STAT 41031 or STAT 51231. (Typically offered: Fall)

STAT 53133. Regression Analysis. 3 Hours.
Review of matrix algebra, parameter estimation in linear models, regression diagnostics, collinearity, variable selection, nonparametric regression, Bayesian regression. Prerequisite: STAT 50133 or departmental consent. (Typically offered: Spring)

STAT 53333. Analysis of Categorical Responses. 3 Hours.
Statistical tools to analyze univariate and multivariate categorical responses. Emphasis is given to Generalized Linear Models, including logistic regression and loglinear models. Prerequisite: STAT 50133 or departmental consent. (Typically offered: Spring)

STAT 53533. Methods of Multivariate Analysis. 3 Hours.
Statistical tools to analyze multivariate datasets. Topics include the multivariate linear model, principal component analysis, factor analysis, linear discriminant analysis, clustering, classification and regression trees, support vector machines, nonlinear dimensionality reduction. Prerequisite: STAT 53133, and graduate standing in mathematics or statistics, or departmental consent. (Typically offered: Spring)

STAT 53733. Experimental Design. 3 Hours.
Topics in the design and analysis of planned experiments, including randomized block, Latin square, split plot, and BIB designs, use of fractional factorial replication, and repeated measures. Graduate degree credit will not be given for both STAT 43733 and STAT 53733. Prerequisite: STAT 50133. (Typically offered: Spring)

STAT 53833. Time Series Analysis. 3 Hours.
Identification, estimation and forecasting of time series. Spectral analysis including the fast Fourier transform computational aspects are emphasized. Prerequisite: STAT 51033, and graduate standing in mathematics or statistics, or departmental consent. (Typically offered: Fall, Spring and Summer)

STAT 54133. Spatial Statistics. 3 Hours.
Applied spatial statistics, covering univariate spatial modeling (kriging), multivariate spatial modeling (cokriging), methods of estimation and inference, and spatial sampling designs. Special relevance to remote sensing. Prerequisite: STAT 53133, and graduate standing in mathematics or statistics, or departmental consent. (Typically offered: Fall)

STAT 54433. Computational Statistics. 3 Hours.
In-depth introduction to computer-based algorithms used for inference and forecasting. Course content may vary by semester. Possible algorithms covered could include: resampling methods (bootstrap), Markov chain Monte Carlo, variable selection in high-dimensional regression (LASSO and LARS), artificial neural networks, ensemble methods (boosting, bagging, random forests), and kernel methods. Prerequisite: STAT 51133 or departmental consent. (Typically offered: Spring)

STAT 5500V. Statistical Consulting. 1-3 Hour.
Designed to give students a statistical consulting practicum. Students meet with clients, analyze data and prepare reports for the clients. (Typically offered: Fall, Spring and Summer) May be repeated for up to 6 hours of degree credit.

STAT 6103V. Research in Statistics. 1-4 Hour.
Research in statistics. Prerequisite: Graduate standing in mathematics or statistics, or departmental consent. (Typically offered: Irregular)

STAT 6393V. Topics in Statistics. 1-3 Hour.
Current state of the art on methodology in one of the topics: multivariate analysis, time series analysis, sequential analysis, factor analysis, or biostatistics. Prerequisite: Graduate standing in mathematics or statistics, or departmental consent. (Typically offered: Irregular) May be repeated for degree credit.