Statistics (STAT)

Courses

STAT 2303. Principles of Statistics (ACTS Equivalency = MATH 2103). 3 Hours.
A problem-oriented course with applications from many fields. Emphasis on understanding the nature of statistical orderliness implied by probability laws. Statistical analysis is treated as a means of decision making in the face of uncertainty. Prerequisite: MATH 1203 or MATH 1204 each with a grade of C or better, or MATH 1313 with a grade of C or better, or a score of at least 50 on the Math Placement Test, or a score of at least 26 on the math component of the ACT exam, or a score of at least 600 on the math component of the old SAT or 620 on the math component of the new SAT. (Typically offered: Fall, Spring and Summer)

STAT 2823. 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 2554. Corequisite: Lab component. (Typically offered: Spring)

STAT 3001L. 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 3003. (Typically offered: Fall and Spring)

STAT 3003. 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 2554 or MATH 2554C. (Typically offered: Fall and Spring)

STAT 3013. 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 2564. (Typically offered: Fall, Spring and Summer)
This course is cross-listed with MATH 3013.

STAT 3113. 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 3013 or departmental consent. (Typically offered: Spring)

STAT 4013. 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: DASC 3213 or approval by the instructor. (Typically offered: Fall)

STAT 4023. 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: DASC 3213 or approval by the instructor. (Typically offered: Spring)

STAT 4033. Nonparametric Statistical Methods. 3 Hours.
Chi square tests. Kolmogorov-Smirnov goodness-of-fit tests, the Mann-Whitney and Wilcoxon 2-sampling tests, and various nonparametric measures of association. Prerequisite: STAT 2303 or STAT 2823 or departmental consent. (Typically offered: Fall, Spring and Summer)

STAT 4043. 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. (Typically offered: Fall, Spring and Summer)

STAT 405V. 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 4101L. 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 4333. 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: Departmental consent. (Typically offered: Spring)

STAT 4373. 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. (Typically offered: Spring)

STAT 5001L. Statistics Methods Laboratory. 1 Hour.
(Formerly STAT 4001L.) Introduction to the statistical software SAS, including its use for common statistical analyses. Graduate degree credit will not be given for both STAT 4001L and STAT 5001L. (Typically offered: Fall and Spring)

STAT 5003. 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 5033. Nonparametric Statistical Methods. 3 Hours.
(Formerly STAT 4033.) Chi square tests. Kolmogorov-Smirnov goodness-of-fit tests, the Mann-Whitney and Wilcoxon 2-sampling tests, and various nonparametric measures of association. Graduate degree credit will not be given for both STAT 4033 and STAT 5033. (Typically offered: Fall, Spring and Summer)

STAT 5043. Sampling Techniques. 3 Hours.
(Formerly STAT 4043.) 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. Graduate degree credit will not be given for both STAT 4043 and STAT 5043. Prerequisite: STAT 5003. (Typically offered: Fall, Spring and Summer)

STAT 505V. Internship in Professional Practice. 1-3 Hour.
(Formerly STAT 405V.) 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 405V and STAT 505V. Prerequisite: Departmental consent. (Typically offered: Fall, Spring and Summer) May be repeated for up to 3 hours of degree credit.

STAT 5103. 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 2574 and graduate standing in mathematics or statistics, or departmental consent. (Typically offered: Fall)

STAT 5113. Statistical Inference. 3 Hours.
Statistical theory of estimation and testing hypothesis. Prerequisite: STAT 5103 and graduate standing in mathematics or statistics, or departmental consent. (Typically offered: Spring)

STAT 5121L. Introduction to R. 1 Hour.
(Formerly STAT 4101L.) 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 4101L or STAT 5121L. (Typically offered: Fall)

STAT 5313. Regression Analysis. 3 Hours.
Review of matrix algebra, parameter estimation in linear models, regression diagnostics, collinearity, variable selection, nonparametric regression, Bayesian regression. Prerequisite: STAT 5003 or departmental consent. (Typically offered: Spring)

STAT 5333. 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 5003 or departmental consent. (Typically offered: Spring)

STAT 5353. 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 5313, and graduate standing in mathematics or statistics, or departmental consent. (Typically offered: Spring)

STAT 5373. Experimental Design. 3 Hours.
(Formerly STAT 4373.) 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 4373 and STAT 5373. Prerequisite: STAT 5003. (Typically offered: Spring)

STAT 5383. 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 5103, and graduate standing in mathematics or statistics, or departmental consent. (Typically offered: Fall, Spring and Summer)

STAT 5413. 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 5313, and graduate standing in mathematics or statistics, or departmental consent. (Typically offered: Fall)

STAT 5443. 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 5113 or departmental consent. (Typically offered: Spring)

STAT 610V. Research in Statistics. 1-4 Hour.
Research in statistics. Prerequisite: Graduate standing in mathematics or statistics, or departmental consent. (Typically offered: Irregular)

STAT 639V. 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.