STAT - Statistics

Courses numbered 500 to 799 = *undergraduate/graduate*. (Individual courses may be limited to undergraduate students only.) Courses numbered 800 to 999 = *graduate*.

STAT 570. Special Topics in Statistics (3).
An umbrella course created to explore a variety of subtopics differentiated by letter (e.g., 570A, 570B). Not all subtopics are offered each semester – see the course schedule for availability. Students enroll in the lettered courses with specific topics in the titles rather than in this root course. Prerequisite(s): departmental consent.

STAT 570G. Statistical Programming in R (3).
Introduces the R programming language for data management, visual representation of data, basic statistical tests, and utilizing R as a programming language for advanced statistical methodology. Topics include data import/export; data format and types; logical operators and control statements; program design; statistical graphics for exploratory data analysis; basic statistical testing; generating random variables and Monte Carlo simulations; and introduction to several advanced computational statistical methods. Prerequisite(s): departmental consent.

STAT 570I. Introduction to Biostatistics (3).
Aims to provide a solid undergraduate foundation in biostatistics and its applications in practical problems. Topics include statistical estimation, hypothesis testing, calculation of power and sample size, and analysis of epidemiologic studies. To succeed in this course, basic calculus and STAT 571 knowledge is required prior to course enrollment. Prerequisite(s): MATH 344 and STAT 571.

STAT 571. Statistical Methods I (3).
A course that aims to provide a solid foundation in statistical theory and its applications in practical problems. Topics include probability models, introduction to nonparametric statistical techniques, and topics in design of experiments. Prerequisite(s): MATH 243 with a grade point of 2.000 or better, or departmental consent.

STAT 572. Statistical Methods II (3).
Topics include points and interval estimates, statistical tests of hypotheses, correlation and regression analysis, least squares, and analysis of variance. Prerequisite(s): STAT 571 or departmental consent.

STAT 574. Elementary Survey Sampling (3).
Reviews basic statistical concepts. Covers simple, random, stratified, cluster and systematic sampling, along with a selection of sample size, ratio, estimation and costs. Applications studied include problems from social and natural sciences, business and other disciplines. Prerequisite(s): any elementary course in statistics, such as STAT 370, SOC 501 or PSY 301 with a grade point of 2.000 or better.

STAT 701. Matrix Theory (3).
Studies matrix theory as a tool for studying linear models, analysis of variance, regression analysis, time series, and multivariate analysis. Topics include Eigenvalues and Eigenvectors, matrix factorization and matrix norms, generalized inverses, partitioned matrices, Kronecker product, vec operator, and matrix derivatives, with applications to statistics in each topic and special emphasis on quadratic forms in normal variates. Although some background in statistics is desirable, it is not necessary. Prerequisite(s): MATH 511 with a grade point of 2.000 or better.

STAT 761. Probability (3).
A study of axioms of probability, discrete and continuous random variables, expectation, examples of distribution functions, moment generating functions, and sequences of random variables. Prerequisite(s): MATH 344 with a grade point of 2.000 or better.

STAT 763. Applied Regression Analysis (3).
Studies linear, polynomial and multiple regression. Includes applications to business and economics, behavioral and biological sciences, and engineering. Uses computer packages for doing problems. Prerequisite(s): STAT 571, MATH 344 and 511 with a grade point of 2.000 or better in each, or departmental consent.

STAT 764. Analysis of Variance (3).
An introduction to experimental design and analysis of data under linear statistical models. Studies single-factor designs, factorial experiments with more than one factor, analysis of covariance, randomized block designs, nested designs, and Latin square designs. Uses computer packages for doing problems. Prerequisite(s): STAT 571, MATH 344 and 511 with a grade point of 2.000 or better in each, or departmental consent.

STAT 771. Theory of Statistics I (3).
An examination of stochastic dependence distributions of functions of random variables limiting distributions, order statistics, theory of statistical inference, non-parametric tests, and analysis of variance and covariance. Prerequisite(s): MATH 547 with a grade point of 2.000 or better, or departmental consent.

STAT 772. Theory of Statistics II (3).
An examination of stochastic dependence distributions of functions of random variables limiting distributions, order statistics, theory of statistical inference, non-parametric tests, and analysis of variance and covariance. Prerequisite(s): MATH 545 or 547 with a grade point of 2.000 or better, or departmental consent.

STAT 774. Statistical Computing I (3).
Trains students to use modern statistical software for statistical modeling and writing of technical reports. Examines many of the advanced features of most commercial statistical packages. Students perform complete statistical analyses of real data sets. Prerequisite(s): STAT 763 and 764, or departmental consent.

STAT 775. Applied Statistical Methods I (3).
Covers selected topics from time series analysis including basic characteristics of time series, autocorrelation, stationarity, spectral analysis, linear filtering, ARIMA models, Box-Jenkins forecasting and model identification, classification, and pattern recognition. Prerequisite(s): STAT 763 with a grade point of 2.000 or better, or departmental consent.

STAT 776. Applied Statistical Methods II (3).
Covers selected topics from multivariate analysis including statistical theory associated with the multivariate normal, Wishart and other related distributions, partial and multiple correlation, principal component analysis, factor analysis, classification and discriminant analysis, cluster analysis, James-Stein estimates, multivariate probability inequalities, majorization and Schur functions. Prerequisite(s): STAT 764 with a grade point of 2.000 or better, or departmental consent.

STAT 861. Theory of Probability I (3).
The axiomatic foundations of probability theory emphasize the coverage of probability measures, distribution functions, characteristic functions, random variables, modes of convergence, the law of large numbers and central limit theorem, and conditioning and the Markov property. Prerequisite(s): MATH 743, STAT 771.

STAT 862. Theory of Probability II (3).
The axiomatic foundations of probability theory emphasize the coverage of probability measures, distribution functions, characteristic functions, random variables, modes of convergence, the law of large

numbers and central limit theorem, and conditioning and the Markov property. Prerequisite(s): MATH 743, STAT 771.

STAT 870. Theory of Statistical Inference I (3).
Covers asymptotic theory of maximum likelihood estimation, sufficiency and completeness, unbiased estimation, elements of decision theory and the Neyman-Pearson theory of testing hypotheses. Prerequisite(s): MATH 743, STAT 771.

STAT 871. Theory of Statistical Inference II (3).
Covers asymptotic theory of maximum likelihood estimation, sufficiency and completeness, unbiased estimation, elements of decision theory and the Neyman-Pearson theory of testing hypotheses. Prerequisite(s): MATH 743, STAT 771.

STAT 872. Theory of Linear Models I (3).
An introduction to the theory of linear models and analysis of variance. Includes multivariate normal distribution, distributions of quadratic forms, general linear models, general linear hypothesis, confidence regions, prediction and tolerance intervals, design models (1-factor and 2-factor), analysis of covariance and components-of-variance models. Prerequisite(s): MATH 511, STAT 772.

STAT 873. Theory of Linear Models II (3).
An introduction to the theory of linear models and analysis of variance. Includes multivariate normal distribution, distributions of quadratic forms, general linear models, general linear hypothesis, confidence regions, prediction and tolerance intervals, design models (1-factor and 2-factor), analysis of covariance and components-of-variance models. Prerequisite(s): MATH 511, STAT 772.

STAT 876. Nonparametric Methods (3).
An introduction to the theory of nonparametric statistics. Includes order statistics, tests based on runs, tests of goodness of fit, rank-order statistics; one-, two- and k-sample problems; linear rank statistics, measure of association for bivariate samples, and asymptotic efficiency. Prerequisite(s): STAT 772.

STAT 877. Multivariate Statistical Methods (3).
Elementary theory and techniques of analyzing multidimensional data; covers Hotelling's T2, multivariance analysis of variance, principal components analysis, linear discrimination analysis, canonical correlation analysis, and analysis of categorical data. Prerequisite(s): MATH 511, STAT 772.

STAT 878. Special Topics (2-3).
An umbrella course created to explore a variety of subtopics differentiated by letter (e.g., 878A, 878B). Not all subtopics are offered each semester – see the course schedule for availability. Students enroll in the lettered courses with specific topics in the titles rather than in this root course. Prerequisite(s): departmental consent.

STAT 878G. Introduction to Statistical Machine Learning (3).
Aims at introducing popular statistical machine learning tools commonly used as data analysis techniques. Topics include probability and statistics, dimension reduction, regression, classification and clustering. To succeed in this course, basic calculus and statistics knowledge is needed prior to course enrollment. Prerequisite(s): MATH 344 and STAT 571.

STAT 878X. Statistical Inference Under Multivariate Order Restrictions (3).
Designed for the students who have completed the study on restricted estimation under order restrictions and need the further knowledge on hypothesis testing in multivariate order restriction settings. Prerequisite(s): departmental consent.

STAT 879. Individual Readings (1-5).
Arranged individual readings in specialized content areas under the supervision of a faculty member. Repeatable for a total of 6 credit hours. Prerequisite(s): departmental consent.

STAT 884. Statistical Computing II (3).
Teaches special graphics and numerical methods needed in the analysis of statistical data. Includes advanced simulation techniques, numerical methods for linear and nonlinear problems, analysis of missing data, smoothing and density estimation, projection-pursuit methods, and graphic techniques. Prerequisite(s): MATH 751 and STAT 772 with C or better or departmental consent.

STAT 978. Advanced Independent Study in Probability and Statistics (1-3).
Arranged individual directed study in an area of probability or statistics. Repeatable for a total of 6 credit hours. Prerequisite(s): must have passed the PhD qualifying exam and instructor's consent.

STAT 986. PhD Dissertation (1-9).
Student-driven research experience to address a specific research question. Potential topics should be formulated by the student and discussed with their advisor. Repeatable for credit. Prerequisite(s): must have passed the PhD preliminary exam.