

DIVISION OF STATISTICS

M.S./Ph.D

Course Descriptions (Graduate Courses)

570. INTRODUCTION TO PROBABILITY THEORY (3). Includes probability spaces, random variables, discrete, continuous, mixed probability distributions, moment generating functions, multivariate distributions, conditional probability, conditional expectation, special distributions, laws of large numbers, and central limit theorem. PRQ: MATH 232 and MATH 240, or consent of division.
571. PROBABILITY MODELS AND APPLICATIONS (3). Introduction to elementary stochastic processes and their applications to various phenomena in engineering, management science, the physical and social sciences, and operations research. PRQ: STAT 570 or consent of division.
572. INTRODUCTION TO MATHEMATICAL STATISTICS (3). Includes distributions of functions of random variables, interval estimation, sufficiency, completeness, point estimation, statistical hypotheses, analysis of variance, and the multivariate normal distribution. PRQ: STAT 570 or consent of division.
573. STATISTICAL METHODS AND MODELS I (3). A first course in statistical methods and models including exploratory data analysis and graphical techniques, regression analysis, experimental design, and basic sampling techniques. Extensive use of statistical computer packages. PRQ: MATH 211 and STAT 301, or STAT 350, or consent of division. CRQ: STAT 573A.
- 573A. STATISTICAL COMPUTING PACKAGES (1). Introduction to statistical computing with the aid of software packages. Data entry, transformations, simple plots, summary statistics, and statistical procedures. No previous computer experience is required. PRQ: MATH 211 and STAT 301, or STAT 350, or consent of division. CRQ: STAT 573 or consent of division.
574. STATISTICAL METHODS AND MODELS II (3). Continuation of STAT 473. Topics include factorial experiments: interactions, nested models, and randomized block designs. Categorical response data analysis: ordinal data measures of association, Cochran-Mantel-Haenszel Test, logistic regression, and measures of agreement. PRQ: STAT 573 and STAT 573A, or consent of division.
578. STATISTICAL METHODS OF FORECASTING (3). Introduction to forecasting including use of regression in forecasting; removal and estimation of trend and seasonality; exponential smoothing; stochastic time series models; stochastic difference equations; autoregressive, moving average and mixed models; model identification and estimation; diagnostic checking; and the use of time series models in forecasting. PRQ: STAT 573 or consent of division.
581. PROBABILISTIC FOUNDATIONS OF ACTUARIAL SCIENCE (3). Actuarial populations. Univariate parametric actuarial distributions including Weibull and Pareto. Multivariate actuarial distributions. Exact and asymptotic relationships among these distributions. Mixtures of distributions. Jointly discrete, continuous, and mixed distributions. Moment, cumulant, and probability generating functions. Transformations of variables for multivariate distributions. Basic theory of individual and collective risk models for aggregate loss from insurance policies. PRQ: STAT 570 or consent of division.
665. REGRESSION ANALYSIS (3). Simple and multiple linear regression, estimation, confidence intervals and tests, and prediction. Diagnostic methods using residuals, transformations, outliers, and influence analysis. Polynomial regression, stepwise variable selection, and collinearity. PRQ: STAT 474 or consent of division.
666. DISCRETE MULTIVARIATE DATA ANALYSIS (3). A first course in the analysis of discrete data including two-dimensional tables, the log linear model, goodness-of-fit of the model, measures of dependence, three and higher dimensional tables, hierarchical models, model selection, ordered categories, logit model, zero frequency problem, and introduction to Bayesian analysis of categorical data. PRQ: STAT 472 and STAT 474, or consent of division.
667. RELIABILITY AND LIFE TESTING (3). Survival function, failure rate, types of censored data, estimation for parametric models, accelerated life tests, competing risks, and Bayesian analysis of survival data. PRQ: STAT 472 and STAT 474, or consent of division.
668. METHODS IN BIostatISTICS (3). Survival function, failure rate, types of censored data, life tables, regression models for life-time data, bioassay, direct assay, indirect assays with quantitative response, and clinical trials. PRQ: STAT 472 and STAT 474, or consent of division.
669. METHODS FOR QUALITY CONTROL AND IMPROVEMENT (3). Control charts for attributes and variables, special control charts, process control techniques, acceptance sampling, process capability, Taguchi's approach to improving quality of a product and the philosophy of Deming. PRQ: STAT 472 and STAT 474, or consent of division.

670. PROBABILITY THEORY (3). Review of measures, measurable functions, and algebras of events. Random variables and their moments and characteristic function. Sequences of random variables and various modes of convergence. Borel-Cantelli Lemma and Kolmogorov 0-1 law. Weak and strong laws of large numbers. Convergence in distributions and central limit theorems. Conditional expectation and martingales. Brownian motion and stochastic processes. PRQ: MATH 630 and STAT 570, or consent of division.
671. STOCHASTIC PROCESSES (3). Markov chains and processes. Brownian motion and Gaussian processes. Point processes and renewal processes. Martingales and weakly dependent stochastic processes. Convergence of stochastic processes. PRQ: STAT 570 or consent of division.
672. THEORY OF STATISTICS (3). Exponential class, elements of decision theory, unbiased estimation, shrinkage estimators, methods for estimating standard errors, multiparameter estimation, generalized likelihood ratio tests, sequential probability ratio test, and linear models. PRQ: STAT 572 or consent of division.
673. LINEAR MODELS (3). Theory of linear models with applications to the analysis of variance and regression and to the design of experiments. PRQ: STAT 572 and STAT 574, or consent of division.
674. DESIGN AND ANALYSIS OF EXPERIMENTS (3). Intermediate course in the design and analysis of experiments including linear models of less than full rank, distributions of quadratic forms, estimable functions; confounding, fractional replication; incomplete block, hierarchical, Latin square, cross-over, split plot, repeated measures and related designs, response surface methods, covariance analysis. PRQ: STAT 572 and STAT 574, or consent of division.
675. MULTIVARIATE METHODS OF STATISTICS (3). Introduction to the techniques of multivariate analysis including description of multivariate data, reducing the dimension, principal components, factor analysis, estimation and testing for the parameters in multinormal populations, and multivariate analysis of variance. Problems which involve the use of computers will be treated. PRQ: STAT 572 or STAT 574, or consent of division.
676. DISTRIBUTION-FREE STATISTICS (3). Survey of nonparametric statistical techniques and their logical foundations including the distributions of order statistics and ranks, tests of hypotheses, confidence intervals and Hodges-Lehmann estimators for one-sample, two-sample, and paired sample location problems, the two-sample dispersion problem, analysis of one-way and two-way layouts, tests of independence, goodness-of-fit tests, linear rank statistics, and U-statistics. PRQ: STAT 572 or STAT 574, or consent of division.
677. SAMPLING TECHNIQUES (3). Introduction to sample survey techniques and sampling theory including estimation of population parameters based on simple random sampling, cluster sampling, stratified sampling, and ratio sampling. Includes a summary of recent advances in sampling theory and discussions of practical problems and sources of error in surveys. PRQ: STAT 572 or STAT 574, or consent of division.
678. TIME SERIES ANALYSIS (3). Models for analysis of time series data including mean and covariance functions of stationary time series, moving average, autoregressive and mixed models, identification and estimation in ARMA (p,q) models, asymptotic properties of estimators, periodogram and spectral analysis, and regression with time series error. PRQ: STAT 572 and STAT 574, or consent of division.
679. ADVANCED STATISTICAL METHODS (3). Various topics discussed from the perspective of modeling and analyzing data. Emphasis on application of statistical methodology. Data analytic techniques illustrated with several types of data including categorical data, multivariate data, survival data, linear and nonlinear regression data, time series data, and data from designed experiments. Extensive use of modern statistical software. PRQ: STAT 572 and STAT 574, or consent of division. Recommended: MATH 662.
691. STATISTICAL CONSULTING (3). Techniques for problem formulation. Identification of parameters and solutions. Client-consultant interaction techniques. Ill-posed problems and their formulation. Management of consulting time, facilities, and personnel. Participation under supervision in actual consulting projects. PRQ: Consent of division.
693. GRADUATE READING IN PROBABILITY AND STATISTICS (1-9). May be repeated to a maximum of 9 semester hours. PRQ: Consent of division.
699. MASTER'S THESIS (1-6). May be repeated to a maximum of 6 semester hours. PRQ: Consent of division.
775. TOPICS IN STATISTICS (3). Content varies; may include courses in linear models, estimation, hypothesis testing, decision theory, and Bayesian inference. May be repeated to a maximum of 15 semester hours. PRQ: Consent of division.
790. SEMINAR IN STATISTICS (1-9). Discussions on topics in advanced probability and statistics as scheduled. Topics include but are not limited to probability theory, stochastic processes, statistical inference, nonparametric statistics, multivariate analysis, linear and nonlinear models, discrete data analysis, time series. One to 9 semester hours as scheduled. May be repeated to a maximum of 24 semester hours, not more than 15 of which may be on a single topic. PRQ: Consent of division.

For more information about the exams or course availability

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