STATISTICS AND PROBABILITY

STT

College of Natural Science

Introductory courses are further classified as follows:

315—for undergraduate students of Business Administration.

201—survey course.

421, 422, 423—minimal sequence for students planning to use statistical methods in their research.

441, 442, 443—minimal sequence in theory of probability and statistics. Qualified students should take the 861, 862, 863 sequence instead.

861, 862, 863—sequence for students preparing to do advanced work in statistics.

201. Statistical Methods

Fall, Winter, Spring, Summer, 4(4-0) MTH 108 or MTH 111. Primarily for students in psychology, sociology, anthropology, political science, economics, business administration, and forestry. Credit may not be earned in more than one of the following: STT 201, STT 315, STT 421.

421. Statistics I

Fall, Winter, Spring, Summer, 4(4-0) MTH 108. Credit may not be earned in more than one of the following: STT 201, STT 315, STT 421. This course and STT 422, STT 423 form a one-year sequence in statistics for those without a calculus background: STT 421 provides an introduction to the main ideas of probability and statistics. The course sequence STT 441-2-3 and STT 861-2-3 form one year's sequence in statistics for those with a calculus background. Those expecting to use statistics in their graduate research should complete one of the full year sequences.

Descriptive statistics, elementary probability, random variables, expectation, and variance. Central Limit Theorem, point estimation. One sample confidence intervals, tests based on the binomial, normal, t, chi square distributions.

422. Statistics II

Fall, Winter, Spring, Summer, 3(3-0) STT 421. Two sample confidence intervals and tests based on the normal and t distributions. Nonparametric models, contingency table analysis, simple linear regression, one way analysis of variance.

423. Statistics III

Fall, Winter, Spring, 3(3-0) STT 422. Multiple regression. Analysis of variance for various experimental designs such as randomized block, factorial, nested and Latin square designs.

441. Probability and Statistics I: Probability

Fall, Winter, Spring, Summer, 4(4-0) MTH 215. Mathematical probability as a basis for the theory of statistics. Discrete and continuous probability models, conditional probability and independence, random variables, central limit theorem, sampling distributions.

442. Probability and Statistics II: Inference

Winter, Spring, 4(4-0) STT 441; MTH 334 or concurrently. Estimation, confidence intervals, tests of hypotheses, linear models.

443. Probability and Statistics III: Inference

Spring, 4(4-0) STT 442. Multiple linear regression, analysis of variance, goodness-of-fit tests, certain non-parametric tests.

461. Computations in Statistics and Probability

Spring, 4(4-0) STT 441, MTH 334, one course in computer science or approval of department. Computer algorithms for evaluation, simulation and visualization; sampling from prescribed distributions; robustness and error analysis of procedures relied on statistical packages; graphics for data display; computation of probabilities and predictency.

490. Statistical Problems

Fall, Winter, Spring, 4(4-0) MTH 215. Discrete and continuous probability models, conditional probability, independence, random variables. Estimation and testing, including one- and two-sample tests and confidence intervals. Applications to engineering problems.

520. Biostatistical and Epidemiological Reasoning

Fall, 4(4-0) Approval of instructor. Interdepartmental with and administered by the Department of Community Health Science. Concepts and principles from biostatistics and epidemiology to facilitate critical reading and literature relevant to clinical medicine and community health. Emphasis on design and interpretation.

825. Sample Surveys

Fall, 3(3-0) STT 443 or STT 442 or STT 445. Application of statistical sampling theory to survey designs involving simple random, stratified, and systematic samples; sub-sampling, double sampling; ratio and regression estimates; other topics.

836. Nonparametric Statistics

Spring, 4(4-0) STT 442 or STT 882. Current tests of hypotheses which may be made without specification of the underlying distribution. Rank tests and tests based on permutations of observations. Tolerance and confidence sets. Large-sample distributions. Applications to research in the social and natural sciences.

841. Linear Statistical Models

Fall, 4(4-0) STT 463 or STT 885. Use of linear statistical models: Curve fitting, simple and multiple regression analysis, multiple and partial correlation coefficients, the analysis of variance, simultaneous confidence intervals, more complex experimental designs.

854. Multivariate Analysis

Winter of even-numbered years, 3(3-0) STT 445 or STT 863. The multivariate normal distribution, tests of hypotheses on means, discriminant analysis, multivariate analysis of variance, principal components, factor analysis, analysis of multivariate categorical data.

844. Time Series Analysis

Winter of odd-numbered years, 3(3-0) STT 443 or STT 863. The autocorrelation function and its spectrum, moving average and autoregressive processes, model identification and estimation.

852. Methods in Operations Research I

Winter, 3(3-0) STT 441 or STT 861. Optimization techniques and probability models with a wide variety of applications: linear programming, including special problems; network analysis, including PERT; dynamic programming; game theory; queuing theory. Acquaintance with matrices advisable.

853. Methods in Operations Research II

Spring, 3(3-0) STT 852. Continuation of STT 852. Inventory theory; Markov chains with applications; simulation as adjacent to mathematical models; advanced topics in linear programming; non-linear programming.

861. Theory of Probability and Statistics I

Fall, 4(4-0) MTH 424 or MTH 427 or concurrently. Discrete probability models. Random variable expectation, combinatorial analysis, conditional probability and independence, generating functions, some special discrete distributions, continuous probability models.
862. Theory of Probability and Statistics II
Winter. 4(4-0) STT 861; MTH 425 or MTH 426 or concurrently.
Continuous probability models, density transformations, some special continuous distributions, limit laws. Introduction to statistical inference, estimation of parameters, hypothesis testing.

863. Theory of Probability and Statistics III
Spring. 4(4-0) STT 862; MTH 334, MTH 426 or MTH 429 or concurrently.
Continuation of hypotheses testing, sufficiency, Rao-Blackwellization, some nonparametric methods, linear models.

864. Stochastic Models in Biology
Fall of even-numbered years. 3(3-0) STT 441 or STT 861.
Stochastic processes. Selected topics from growth processes, epidemic theory, prey-predator models, mathematical genetics.

870. Theory of Measure and Probability
Fall. 3(3-0) MTH 821 or concurrently.

872. Theory of Statistics I
Winter. 3(3-0) STT 870; MTH 822 or concurrently.
Important distributions. Order statistics, Slutsky theorem and additional properties of vague convergence. Basic concepts of decision theory. A survey of basic statistical methods.

873. Theory of Statistics II
Spring. 3(3-0) STT 872.
Basic concepts and properties of estimation and hypothesis testing. Linear models.

876. Statistical Inference in Economics I
Fall. 3(3-0) ECS 812A or ECS 805A; STT 443 or STT 863; or approval of department. Interdepartmental with the departments of Agricultural Economics and Economics. Administered by the Department of Economics. Review and extension of single-equation regression models. Properties of least-squares estimators under alternative specifications. Problems of analyzing nonexperimental data. Errors in variables, autoregressive and heteroscedastic models.

877. Statistical Inference in Economics II
Winter. 3(3-0) ECS 876 or approval of department. Interdepartmental with the departments of Agricultural Economics and Economics. Administered by the Department of Economics. Specification interpretation and estimation of simultaneous equation models. Nonlinear models. Bayesian approach to estimation problems. Recent developments in econometrics.

878. Statistical Inference in Economics III
Spring. 3(3-0) ECS 877 or approval of department. Interdepartmental with the departments of Agricultural Economics and Economics. Administered by the Department of Economics. Validation and application of dynamic econometric models. Bayesian approach to estimation problems. Recent developments in econometric methods and in applied econometric research.