

**Descriptions — Sociology  
of  
Courses**

**981. Comparative Sociology**

Fall, 3 or 4 credits. Doctoral student in sociology; completion of core courses.

Macro-sociological studies of societies. The relationship of the whole to the varied parts of societies, the connection between societies, and the patterns of change in different societies. The development of research with respect to the cross-cultural study of social structures, social institutions, and social systems.

**982. Comparative Social Psychology**

Winter, 3 or 4 credits. SOC 981.

Social psychological research problems involving a comparative methodology. Social psychological functions of education, mobility, mass media use, etc. Comparative study of the social psychology of modernization.

**983. Comparative Research Methods**

Spring, 3 or 4 credits. SOC 981.

Sampling problems, data collection strategies, problems of translation and concept equivalence. Management, analysis and interpretation of cross-cultural data.

**991. Seminar in Work and Organizations**

Winter, 4(4-0) May reenroll for a maximum of 8 credits. Thirty graduate credits and approval of instructor.

Selected topics in the sociology of work, occupations, and complex organizations.

**999. Doctoral Dissertation Research**

Fall, Winter, Spring, Summer. Variable credit. Approval of department.

**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, agriculture, and forestry. Credit may not be earned in more than one of the following: STT 201, STT 315, STT 421.

Descriptive statistics, elementary probability and combinatorics. The binomial distribution. Random variables, their expectations and variances. Central Limit Theorem, estimation and inference. Simple tests based on the binomial, normal, t, chi-square and F distributions.

**290. Special Topics in Statistics and Probability**

Fall, Winter, Spring, 1 to 6 credits. May reenroll for a maximum of 6 credits. MTH 108 or approval of department.

**315. Introduction to Probability and Statistics for Business**

Fall, Winter, Spring, Summer, 4(5-0) MTH 111. Credit may not be earned in more than one of the following: STT 201, STT 315, STT 421.

Descriptive statistics, elementary probability, random variables, probability models, sampling distributions, the Central Limit Theorem, confidence intervals and one-sample tests based on normal, t and chi-square with applications to business problems.

**317. Quantitative Business Research Methods**

Fall, Winter, Spring, Summer, 4(5-0) STT 315. Interdepartmental with and administered by the Department of Marketing and Transportation Administration.

Application of statistical techniques to business decision making. Topics covered include applications of linear regression and correlation, analysis of variance, selected nonparametric tests, time series, and index numbers.

**351. Probability and Statistics for Engineers**

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.

**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 a few of the main ideas of probability and statistics. The course sequences STT 441-2-3 and STT 861-2-3 form one year sequences 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, combinatorics. Binomial distribution. Random variables, expectations and variances. 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.

**490. Statistical Problems**

Fall, Winter, Spring, 1 to 6 credits. Approval of department.

Individualized study adapted to the preparation and interests of the student.

**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 literature relevant to clinical medicine and community health. Emphasis on design and interpretation.

**825. Sample Surveys**

Fall, 3(3-0) STT 423 or STT 442 or STT 862.

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.

**826. Nonparametric Statistics**

Spring, 4(4-0) STT 442 or STT 862.

Current tests of hypotheses which may be made without specification of the underlying distribution. Rank tests and tests based on permutation 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 443 or STT 863.

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.

**843. Multivariate Analysis**

Winter of even-numbered years, 3(3-0) STT 443 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.

**SPANISH**

See Romance and Classical Languages.

**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 statistics. Qualified students should take the 861, 862, 863 sequence instead.

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

- 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 adjunct 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 428 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.  
Measures and integrals. Uniqueness of extensions. Algebraic and continuity properties. Densities. Fubini theorem. Convergence concepts. Measurable transformations. Independence. Laws of large numbers, characteristic functions, central limit theorem in iid case.
- 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) EC 812A or EC 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) EC 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) EC 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.
- 882. Probability I**  
Winter. 3(3-0) STT 870; MTH 822 or concurrently.  
Laws of large numbers, random series, central limit problem, stable laws.
- 883. Probability II**  
Spring. 3(3-0) STT 882.  
Extension theorems for integrals including the Kolmogorov theorem. The Radon-Nikodym theorem. Conditional expectations, transitions. Convergence in  $L_p$  spaces.
- 886. Stochastic Processes and Applications I**  
Winter. 3(3-0) STT 441 or STT 861.  
Discrete and continuous time Markov processes including the ergodic theorem. Other topics selected from: stationary processes, Brownian motion, stochastic differential equations, Counting and Poisson processes, queuing processes, branching processes.
- 887. Stochastic Processes and Applications II**  
Spring. 3(3-0) STT 886 or approval of department.  
Continuation of STT 886.
- 890. Statistical Problems**  
Fall, Winter, Spring, Summer. 1 to 4 credits. May reenroll for a maximum of 36 credits. Approval of department.
- 899. Master's Thesis Research**  
Fall, Winter, Spring, Summer. Variable credit. Approval of department.
- 929. Foundations of Decision Theory**  
Fall. 3(3-0) STT 873, STT 883.  
Statistical decision model. Principles of choice. Sufficiency, completeness, invariance, monotonicity, Bayes. Families of probability models: exponential, location-scale.
- 951. Advanced Theory of Nonparametric Statistics**  
Spring of even-numbered years. 3(3-0)  
STT 929.  
Possible topics include small and large sample properties of distribution free tests; robust estimation of location, scale and regression parameters; nonparametric ANOVA.
- 952. Asymptotic Theory**  
Winter of even-numbered years. 3(3-0)  
STT 929.  
Possible topics include large sample behavior of likelihood functions; contiguity; Bahadur and Pitman efficiency of statistical procedures.
- 954. Sequential Analysis**  
Spring of odd-numbered years. 3(3-0)  
STT 929.  
Possible topics include sequential estimation, testing and design; optimal stopping.
- 955. Estimation and Testing**  
Winter of odd-numbered years. 3(3-0)  
STT 929.  
Possible topics include completeness and admissibility results for the family of Neyman-Pearson tests, minimum variance estimates, admissibility of estimates in exponential families and estimation in the normal multivariate case.
- 961. Convergence of Measures and Random Variables**  
Fall of odd-numbered years. 3(3-0)  
STT 883.  
Topology of vague convergence of measures. Conditions for relative compactness of a set of measures. Relationships between vague, almost sure, and in-measure convergence. Donsker's theorem and its extensions; applications to statistics.
- 962. Martingales**  
Winter of even-numbered years. 3(3-0)  
STT 883.  
Convergence, sampling, decomposition and stopping of sub- and super-martingales. Relationship with differentiation of measures. Applications to sequential analysis and boundary crossing probabilities.
- 963. Stochastic Analysis**  
Spring of even-numbered years. 3(3-0)  
STT 883.  
Brownian motion. Stochastic integrals. Ito's formula. Stochastic differential equations. Diffusion processes.
- 964. Renewal Theory and Random Walk**  
Fall of even-numbered years. 3(3-0)  
STT 883.  
Renewal events and processes, random walk, Wiener-Hopf factorization, Tauberian theorem. Renewal-Type Equations. Branching processes, birth and death processes.
- 965. Stationary and Second Order Processes**  
Winter of odd-numbered years. 3(3-0)  
STT 883.  
Stationary, second order, and Gaussian processes. Sample path properties. Linear and nonlinear prediction and estimation. Applications.
- 966. Markov Processes**  
Spring of odd-numbered years. 3(3-0)  
STT 883.  
Transition functions, semigroups, generators. Sample path properties. Strong Markov property. Characterization and convergence of Markov processes. Ergodicity.

**Descriptions — Statistics and Probability  
of  
Courses**

**990. Problems in Statistics and Probability**  
Fall, Winter, Spring, Summer. 1 to 4 credits. May reenroll for a maximum of 10 credits. STT 873.

Seminar or individual study on an advanced topic in statistics.

**995. Topics in Statistics and Probability**  
Fall, Winter, Spring, Summer. 1 to 4 credits. May reenroll for a maximum of 36 credits.

Nonparametric statistics, multivariate statistical analysis, statistical time series analysis, Bayesian statistics, reliability theory, stochastic approximation, design of experiments, sets of decision problems, stochastic processes, sequential analysis, other topics.

**999. Doctoral Dissertation Research**  
Fall, Winter, Spring, Summer. Variable credit. Approval of department.

**STUDIO ART**

See Art.

**SURGERY**

**SUR**

**College of Human Medicine**

**608. Basic Surgery Clerkship**  
Fall, Winter, Spring, Summer. 6 to 15 credits. May reenroll for a maximum of 30 credits. H M 602.

An introduction to the surgical patient, stressing surgical diagnosis, pre-operative evaluation and post-operative care. Objectives are designed to help the student attain acceptable levels of surgical competence for physicians.

**609. Otolaryngology Clerkship**  
Fall, Winter, Spring, Summer. 1 to 17 credits. May reenroll for a maximum of 34 credits. H M 602.

Common otolaryngologic disorders, emergencies, including diagnosis and treatment, and judgments concerning proper management by primary physicians.

**610. Plastic Clerkship**  
Fall, Winter, Spring, Summer. 1 to 17 credits. May reenroll for a maximum of 34 credits. H M 602.

Principles of wound healing and tissue repair. Indications and applications of plastic procedures.

**611. Urology Clerkship**  
Fall, Winter, Spring, Summer. 1 to 17 credits. May reenroll for a maximum of 34 credits. H M 602.

Demonstration of clinical manifestations of genito-urinary disease, investigative methods and techniques of diagnosis and management, familiarity with urologic emergencies and performance of basic urologic skills.

**613. Orthopedic Clerkship**  
Fall, Winter, Spring, Summer. 1 to 17 credits. May reenroll for a maximum of 34 credits. H M 602.

Diagnostic and management information and skills, including emergencies, in common orthopedic problems.

**614. Neurosurgery Clerkship**  
Fall, Winter, Spring, Summer. 1 to 17 credits. May reenroll for a maximum of 34 credits. H M 602.

A hospital-based experience to provide the student with familiarity with the field and understanding of the contribution of neurosurgery in medicine generally.

**615. Ophthalmology Clerkship**  
Fall, Winter, Spring, Summer. 1 to 17 credits. May reenroll for a maximum of 34 credits. H M 602.

Development of skills and knowledge in ophthalmoscopy, neuro-ophthalmology, visual function, and management of problems such as glaucoma, the red eye, and trauma.

**616. Thoracic Surgery Clerkship**  
Fall, Winter, Spring, Summer. 1 to 17 credits. May reenroll for a maximum of 34 credits. H M 602.

Problem-solving in thoracic medicine and surgery, also stressing pulmonary physiology, use of diagnostic tools and tests, and indications for surgical procedures.

**618. Anesthesiology Clerkship**  
Fall, Winter, Spring, Summer. 4 to 16 credits. May reenroll for a maximum of 16 credits. H M 602.

Introduces common anesthetic agents and provides opportunity for performing anesthetic procedures under faculty supervision.

**619. General Surgery Elective Clerkship**  
Fall, Winter, Spring, Summer. 4 to 16 credits. May reenroll for a maximum of 16 credits. H M 602 and SUR 608.

Experiences in clinical general surgery.

**620. Advanced Surgery Clerkship**  
Fall, Winter, Spring, Summer. 6 to 8 credits. May reenroll for a maximum of 16 credits. SUR 608; MED 608.

Focus on advanced clinical and surgical skills. Students have more responsibility for patient care and direct learning to specific topics in general or subspecialty surgery. Clerkship options vary by community.

**621. Nutritional Care of Surgical Patients**  
Fall, Winter, Spring, Summer. 4 to 12 credits. SUR 608, MED 608, approval of instructor.

Clinical experience on the Nutrition Team in dealing with surgical and medical patients requiring therapeutic nutrition as a result of metabolic derangement and nutritional deficiencies. Major emphasis on nutritional assessment and formulation of plans of management through intravenous support.

**SYSTEMS SCIENCE**

See Electrical Engineering and Systems Science.

**TEACHER EDUCATION T E**

**College of Education**

**101. Exploring Teaching**  
(ED 101A.) Fall, Winter, Spring, 3(2-3)

Examination of the manifest and hidden curriculum in classrooms; the multiple purposes of schooling; individual reasons for choosing teaching; participant/observation in a local classroom required.

**200. Individual and the School**  
(ED 200.) Fall, Winter, Spring, Summer. 5(5-0) Not open to students with credit in T E 200A, T E 200B, T E 200C or T E 200D.

Major psychological factors in the school learning-teaching situation; concepts in human development related to problems in the school situation; teacher's role in motivation, conceptual learning, problem solving, and the development of emotional behavior, attitudes and values, learning of skills, retention and transfer; and measurement of student abilities and achievement.

**200A. Educational Psychology for Teacher Decision Making**  
(ED 200A.) Fall, Winter. 3(2-2) Open only to students in Multiple Perspectives emphasis or approval of department.

Principles and theories of learning and development and the ways these ideas may be used to make teaching decisions.

**200B. Educational Psychology of Individual Differences in Classrooms**  
(ED 200B.) Winter. 3(3-0) Open only to students in Heterogeneous Classrooms emphasis or approval of department.

Educational psychology foundations of the range of diverse capabilities and characteristics found among school children and the implications of these differences for instruction.

**200C. Learning of School Subjects**  
(ED 200C.) Fall. 3(2-2) Open only to students in Academic Learning emphasis or approval of department.

Theories of knowledge and learning that explain and justify the teaching of school subjects in elementary and secondary schools.

**200D. Personal and Social Dimensions of Teaching**  
Fall. 3(3-0) Open only to students in Learning Community emphasis or approval of department.

Theory and practice of the personal and social dimensions of teaching, including communication skills, interpersonal and group dynamics, and personal educational philosophy.

**201B. Instructional Implications of Individual Differences**  
Spring. 2(2-0) Open only to students in Heterogeneous Classrooms emphasis or approval of department.

Ways that instructional characteristics and teacher behavior interact with students' entering characteristics to influence student learning and behavior in the classroom.

**201D. Student Learning and Development**  
Fall. 3(3-0) Approval of department.

Relevant theory and research relating to human learning and development in school-age children. Emphasis on affective teacher/student factors contributing to classroom learning community.