955. Field Research Methods
Spring. 4 credits. SOC 312; approval of department.
An overview of the design and execution of social research.

956. Seminar in Small Group Research
Fall. 4(4-0) Thirty graduate credits including SOC 811, or approval of department.
The experimental and theoretical investigation of organizational processes in small groups.

957. Seminar in Selected Theoretical Issues
Spring of odd-numbered years. 4(4-0)
May reenroll for a maximum of 8 credits. SOC 845.
Issue approach to social theory. Selected themes relate to substantive problems in theory, theory construction or the work of a historical or contemporary thinker.

958. Comparative Rural Social Organization
Spring. 4 credits.
Structure and function of social organizations ranging from societies to small groups. The comparative approach will be used in studying phenomena involved in the transitions from agrarian to industrial societies.

959. 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.

960. Symbolic Interaction: Theory and Research
Spring. 4(4-0) SOC 811; social psychology concentration.
Theoretical and research problems within the framework of systematic interaction and the socialization process and the development, maintenance, and enhancement of the self. Critique of the literature and proposals for new research directions.

961. Introduction to Formal Theory in Sociology
Spring. 4(4-0) STT 422, a course in research methods.
Analysis of the structure of formal theory in sociology and of the problems of interpretation and verification of deterministic and probabilistic theories. Examination of specific practices of theory construction.

962. Theories of Conflict and Change
Fall. 3 or 4 credits. Approval of department.
Major theoretical and practical contributions to the study of conflict and change.

963. Race, Politics, and Social Structure
Winter. 5(3-0) Approval of department.
Racism, including the social mechanisms by which it is created, maintained, and lessened, and the variant forms of political action related to racism and social structure.

964. War and International Conflict
Spring. 3(3-0) Approval of department.
Causes, structure and patterns of wars between societies, revolutions within societies and the relation of war and revolution to cross-cultural conflict and change.

965. Values, Crises and Utopias in a Post-Modern Society
Fall. 3(3-0) Approval of department.
Macro-sociological approach to study of social problems and stresses; planned change; and conscious improvement of modern societies.

966. Theoretical Perspectives in Sociology
Winter. 4 credits. SOC 845 or SOC 846.
Comparison and analyses of concepts, conceptual schemes and theories of outstanding social theorists in relation to modern research.

967. Economic History of Latin America
Fall, Winter, Spring. 4 credits.
Introduction to the economic development of Latin America.

968. Latin American Development
Winter. 4 credits.
The political, social, and economic development of Latin America.

969. Latin American Politics
Fall. 4 credits.
The political development of Latin America.

970. Latin American Social Structure
Spring. 4 credits.
The social development of Latin America.

971. 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.

972. 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.

973. 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.

974. Doctoral Dissertation Research
Fall. Winter. Spring. Summer.
Variable credit. Approval of department.

SPANISH
See Romance and Classical Languages.

STATISTICS AND PROBABILITY

STT

College of Natural Science

Introductory courses are further classified as follows:

315, 316—sequence 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.

290. Special Topics in Statistics and Probability
Fall, Winter, Spring. Summer. 1 to 6 credits. May reenroll for a maximum of 9 credits. MTH 108 or approval of department.

315. Introduction to Probability
Fall, Winter, Spring. 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.

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

341. Probability for Teachers
Spring. 4(4-0) MTH 301 or approval of department.
Primarily for majors in mathematical education. Probability theory will be studied as a mathematical structure. Although some examples of the use of the theory will be discussed (as the use of some theorems is discussed in a course in plane geometry) the major emphasis will be on understanding the structure of probability theory.
351. Introduction to Statistics Spring, 4(4-0) MTH 214
Probability models, discrete random variables, the binomial, hypergeometric and Poisson distributions, statistical inference based on the binomial distribution, continuous random variables, test of hypotheses and confidence intervals based on the normal distribution.

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 301, 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 prob and statistics. The course sequences STT 441-2,3 and STT 861-3 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.

422. Statistics II Fall, Winter, Spring, Summer, 3(3-0) STT 421 Nonparametric models, contingency table analysis, sample survey methods, simple linear regression, one-way analysis of variance.

423. Statistics III Fall, Winter, Spring, Summer, 3(3-0) STT 422 Multiple regression. Analysis of variance for various experimental designs, including randomized block, two and three way 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 Fall, Spring, 4(4-0) STT 441; MTH 334 or concurrently.
Estimation, confidence intervals, test of hypotheses, linear hypotheses.

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 required in statistics department.
Individualized study adapted to the preparation and interests of the student.

520. Biostatistical and Epidemiological Reasoning Winter. 3(3-0) 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 of 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 estimation, 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.

833. Mathematical Programming Spring, 3(3-0) EC 800, or EC 812A, MTH 334. Interdepartmental with the departments of Agricultural Economics, and Economics. Administered by the Department of Agricultural Economics. Linear programming. Theory of linear economic models. Topics in nonlinear programming.

841. Linear Statistical Models Fall of odd-numbered years. 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.

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 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, sufficient, Rao-Blackwellization, some nonparametric methods, linear models.

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


872. Theory of Probability and Statistics II Winter. 3(3-0) STT 871; MTH 822 or concurrently. Basic concepts of decision theory. Most powerful tests. Standard statistical methods for use in the binomial, Poisson and normal situation; sequential and nonparametric methods, linear models.

873. Theory of Probability and Statistics III Spring. 3(3-0) STT 872; MTH 927 or concurrently; or approval of department. Asymptotic distributions of some statistics. Cramer-Rao inequality. Asymptotic properties of maximum likelihood methods.

876. Statistical Inference in Economics I Fall, 3(3-0) STT 443 or STT 863; EC 812A or EC 801; 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 variable, autoregressive and heteroclastic 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.
Descriptive Statistics and Probability

866. Stochastic Processes and
Technological Applications
Winter. 3(3-0) STT 841 or STT 861.
Discrete stochastic processes. Markov chains,
birth and death processes, branching processes.
Selected technological applications.

887. Stochastic Models in the
Physical Sciences
Spring. 3(3-0) STT 886 or approval of
department.
Selected models from the physical sciences. These
may include topics from the theory of queues, the
theory of dams, and branching processes in
cosmic ray theory.

890. Statistical Problems
Fall, Winter, Spring, Summer.
Variable credit. Approval of department.

899. Master's Thesis Research
Fall, Winter, Spring, Summer.
Variable credit. Approval of department.

927. Theory of Measure and
Integration
Spring. 3(3-0) MTH 922.
Interdepartmental with and administered by the
Department of Mathematics.
Introduction to the theory of integration over
abstract spaces. Topics include: measure spaces;
measurable and integrable functions; modes of
convergence, theorems of Egoroff, Luzin, Riesz-
Fischer, Lebesgue; absolute continuity, and the
Radon-Nikodym theorem; product measures and
Fubini's theorem. Applications to some of the
classical theories of integration and summability.

928. Measure Theory Applications
to Probability
Fall. 3(3-0) MTH 927.
Kolmogorov extension theorem. Transition
measures. Conditional expectations. Uniform
integrability.

929. Foundations of Decision
Theory
Winter. 3(3-0) STT 928.
Sufficiency, completeness, invariance,
monotonicity. Bayes. Families of probability
models: exponential, location-scale.

937. Systems Simulation
Fall. 4(4-0) MGT 836, STT 433, MTH
228. Interdepartmental with and administered by
the Department of Management.
The concept of a model, model building,
characteristics of simulation models. Techniques
of computer simulation. Simulation models in
research and management planning/control,
validation and experimental design. Special
purpose languages.

948. Mathematical Programming
For Business
Spring. 4(4-0) MGT 836, MTH 334,
MTH 420, STT 893. Interdepartmental with and
administered by the Department of Management.
Large mathematical programs with special
structure. Duality and decomposition in
mathematical programming. Basic theory of
dynamic programming; multistage decision
processes and the principle of optimality. Risk,
uncertainty, and introduction to stochastic and
adaptive control processes.

949. Advanced Applied Stochastic
Processes
Winter. 4(4-0) MGT 836, MGT 937.
Interdepartmental with and administered by the
Department of Management.
Selected topics from the following areas: Semi-
Markov, Markov-renewal and regenerative
process models; Markov decision processes; decision theory, applications from
production, inventory, reliability, queuing,
and gaming theory.

951. Advanced Theory of
Nonparametric Statistics
Fall of odd-numbered years. 3(3-0)
STT 873; STT 928 or concurrently.
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
Spring of even-numbered years. 3(3-0)
STT 873, STT 929.
Possible topics include large sample behavior of
likelihood functions; contiguity; Bahadur and
Pinam efficiency of statistical procedures.

953. Advanced Theory of Linear
Statistical Models
Fall of even-numbered years. 3(3-0)
STT 873; STT 928 or concurrently.
Possible topics include construction and analysis
of linear models; regression; ridge regression;
optimality criteria, relationships and merits;
existence and construction of optimal designs.

954. Sequential Analysis
Spring of odd-numbered years. 3(3-0)
STT 873; STT 929.
Possible topics include sequential estimation,
testing and design; optimal stopping.

956. Martingales
Winter or even-numbered years. 3(3-0)
STT 873; STT 928.
Convergence, stopping, decomposition of
stopping of sub- and super-martingales.
Relationship with differentiation of measures.
Applications to sequential analysis and boundary
crossing probabilities.

958. Diffusion and Brownian Motion
Spring of even-numbered years. 3(3-0)
STT 873; STT 928.
One dimensional diffusion, speed and drift
measures, local time, stochastic integral, Itô's
theorem.

964. Renewal Theory and Random
Walk
Fall of even-numbered years. 3(3-0)
STT 873; STT 928 or concurrently.
Renewal events and processes, random walk,
Wiener-Hopf factorization, Tauberian theorem.
Renewal-Type Equations. Branching processes,
birth and death processes.

965. Second Order Processes
Winter of odd-numbered years. 3(3-0)
STT 873, STT 928.
Stochastic processes studied by the methods of
linear spaces. Sample path properties, representatives, estimation, prediction,
multiplicity.

966. Semi-Groups and
Applications
Spring of odd-numbered years. 3(3-0)
STT 873, STT 928.
Hille-Yosida theorem, processes of independent
increments, infinitely divisible processes, Markov
processes in several dimensions.

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. Variable credit.
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

Surgery Clerkship
Fall, Winter, Spring, Summer. 1 to 17
credits. May reenroll for a maximum of 43
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.

608. Otolaryngology Clerkship
Fall, Winter, Spring. 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.