

**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. 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. 981.
Sampling problems, data collection strategies, problems of translation and concept equivalence. Management, analysis and interpretation of cross-cultural data.

991. Research Seminar in Work and Organization
Winter. 2(2-0) May re-enroll for a maximum of 6 credits. Thirty graduate credits and approval of instructor.
An advanced seminar devoted to analysis of designs used in current research in work and organization.

999. Research
Fall, Winter, Spring, Summer. Variable credits. Approval of department.

SOIL SCIENCE SLS

**College of Agriculture and
Natural Resources**

202. Soils and Man's Environment
Winter. 3(3-0) Interdepartmental with Fisheries and Wildlife and Resource Development Departments and Natural Resources.
Use of soil-water resources in a technological society as it relates to environmental quality. Nature of pollution problems and their possible solutions. Food production and world population.

210. Fundamentals of Soil Science
Fall, Winter. 5 credits.
Principles of the origin and development of soils. Relationship of properties to utilization and soil fertility to plant composition and animal health. Emphasis is placed on changing soils to serve man.

331. Soil Management
Winter. 4(4-0) 210.
Management of soils, drainage and irrigation, organic matter, tillage, rotation, conservation practices, soil reaction, lime, fertilizers, and micronutrients. Soil management vs. soil conservation. Special study in general crops, horticultural crops, greenhouse crops, turf and organic soils.

390. Soil Conservation and Land Use
Spring. 3(3-0) 210.
Soil resources of the United States and methods and plans for soil conservation including control of erosion. Interpretation of soil survey maps and land evaluation for farm crops, fruits, forestry, engineering and wildlife. Soil judging.

410. Special Soil Problems
Fall, Winter, Spring, Summer. 1 to 3 credits. May re-enroll for a maximum of 6 credits. Approval of department.
Independent study topics include: Special soil problems, fertility, geography, classification, conservation, soil management, organic soils and turfgrass soils.

420. Seminar
Winter. 1(1-0) May re-enroll for a maximum of 4 credits. Interdepartmental and administered jointly with Crop Science.

424. Forest Soils
Spring. 4(3-3) 210; FOR 220. Interdepartmental with and administered by the Forestry Department.
Interrelationships of forest site and the growth of forests. Classification and productivity of forest soils. Effects of silvicultural and forest management practices on the soil. Two-day field trip required.

430. Soil Fertility and Fertilizers
Spring. 5(4-1) 210.
Assessment of the fertility of soils and alteration of fertility by the use of fertilizers, lime, manure, and cropping systems. The role of colloids in ion fixation and exchange. Soil and tissue tests. The history, technology, and use of fertilizers.

442. Soil Microbiology
Spring. 4(3-2) MPH 200; 301 or 401. Interdepartmental with and administered by the Microbiology and Public Health Department.
Major groups of microorganisms of importance in soils are studied with emphasis on ecological, biochemical, and physical aspects.

470. Soil Classification and Mapping
Fall, Spring; Summer of odd-numbered years. 4(0-8) 210 or approval of department.
Classification of soils. Interpretation of profiles in relation to land utilization for farm crops, fruits, forestry, highway-airfield engineering, county and township planning, urban development and wildlife. Preparation of land use reports based upon soil maps of assigned areas.

480. Soil Geography and Land Use of the World
Spring. 4(4-0) 210 or approval of department.
Survey of the great soil groups and their use throughout the world, their location, significant characteristics, how they are and can be utilized, and the relation of each to food and population increase.

IDC. The Impact of Animal Resource Management Upon the World's Developing Nations
For course description, see Interdisciplinary Courses.

810. Advanced Studies in Soil Science
Fall, Winter, Spring, Summer. 1 to 5 credits. May re-enroll for a maximum of 6 credits. Approval of instructor.
Areas of work to include: advanced studies in soil science, chemistry, classification, conservation, fertility, geography, management, microbiology and biochemistry, micronutrients, micropedology, mineralogy, organic soils and physics.

820. Seminar
Winter, Spring. 1(1-0) May re-enroll for a maximum of 3 credits. Interdepartmental and administered jointly with Crop Science.
Studies and presentation of research in crop and soil sciences.

825. Clay Mineralogy
(945.) Winter. 4(3-4) 840, 850 or approval of department. Interdepartmental with and administered by the Geology Department.
Structures and properties of clays; their origins, occurrence, and utilization. Methods of studying clays including x-ray diffraction, differential thermal analysis, infrared absorption and other chemical and physical techniques.

830. Soil Fertility and Plant Nutrition
(930.) Spring of odd-numbered years. 3(3-0) 430 or approval of department.
Fundamental concepts in soil fertility and mineral nutrition of plants; fate of nutrients applied to soils, nutrient uptake, translocation and utilization by plants; principles of laboratory, greenhouse and field research methods.

835. Organic Soils
Spring. 2(2-0) Approval of department.
Information pertinent to organic soils formation, classification, water control, conservation, plant nutrients, soil testing, commercial utilization, special crops, road construction, and real estate development will be presented. Field trip included.

840. Soil Physics
Fall. 5(3-6) 430; CEM 162 or approval of department.
Physical properties of soil (texture, structure, consistency, aeration, water, temperature, etc.), their quantitative measurement, and relation to plant growth, and agronomic and engineering practices.

850. Soil Chemistry
Winter. 5(3-6) 430; CEM 162, 383; or approval of department.
Chemistry of mineral weathering and soil formation, ion activities, ionic exchange and equilibrium reactions, soil pH, specific elements and their chemical analysis, and availability of nutrients to plants.

860. Soil Biochemistry
Spring of even-numbered years. 4 credits. 850; MPH 442.
Biochemical transformations of mineral nutrients and of natural and exotic organic materials in soils, considered in relation to chemical, physical and ecological systems in the complex soil environment.

870. Origin and Classification of Soils
Winter. 4(3-2) 470, 840, or approval of department.
Genesis, morphology and classification of major soils of the world. Relationships among soils in natural and cultural landscapes. How soil properties affect their use, management and conservation. Land classifications for various purposes.

880. Fertility and Management of Tropical and Subtropical Soils
Winter. 3(3-0) Approval of department.
Fertility and management of tropical and subtropical soils, the use of soil testing techniques with field studies to evaluate the fertility status and develop cropping systems for optimum production.

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

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

SOUTH ASIAN LANGUAGES

See Linguistics and Oriental and African Languages.

SPANISH

See Romance 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.

881, 882, 883—sequence in analytic probability theory and stochastic processes at graduate mathematics level.

201. Statistical Methods

Fall, Winter, Spring, Summer. 4(4-0) MTH 108 or 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: 201, 315, 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.

315. Introduction to Probability

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

Set and algebra of sets. Chance experiments, outcomes and events. Probabilities of events. Conditional probability, independent trials, Bayes' theorem. Introduction to statistical inference relevant to business decision problems.

316. Fundamentals of Statistical Inference

Fall, Winter, Spring, Summer. 4(5-0) 315. Primarily for students in the College of Business. Interdepartmental with the Marketing and Transportation Administration Department.

Description of sample data, applications of probability theory, sampling, estimation, tests of hypotheses.

317. Quantitative Business Research Methods

Fall, Winter, Spring, Summer. 4(3-2) 316. Interdepartmental with and administered by the Marketing and Transportation Administration Department.

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

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, hyper-geometric and Poisson distributions, statistical inference based on the binomial distribution, continuous random variables, test of hypothesis 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: 201, 315, 421. This course and 422, 423 form a one year sequence in statistics for those without a calculus background; 421 provides an introduction to a few of the main ideas of probability and statistics. The course sequences 441-2-3 and 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 and combinatorics. The binomial distribution. Random variables, their expectations and variances. The Central Limit Theorem, Estimation and inference. Simple tests based on the binomial, normal, t, chi-square and F distributions.

422. Statistics II

Fall, Winter, Spring, Summer. 3(3-0)

421.

Nonparametric tests: sign test, Wilcoxon's rank sum test, Spearman's rank correlation test, run tests. Multiple regression analysis. Least squares estimation and tests for simple linear hypotheses.

423. Statistics III

Fall, Winter, Spring, Summer. 3(3-0)

422.

Application of multiple regression analysis to analysis of variance problems. Design of experiments including randomized block designs. Latin squares, factorial designs, and balanced incomplete block 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) 441; MTH

334 or concurrently.

Estimation, confidence intervals, test of hypotheses, linear hypotheses.

443. Probability and Statistics III: Inference

Fall, Spring. 4(4-0) 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.

825. Sample Surveys

Fall. 3(3-0) 423 or 442 or 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) 442 or 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 812A, MTH 334. Interdepartmental with the Agricultural Economics and Economics Departments and administered by the Agricultural Economics Department.

Linear programming. Theory of linear economic models. Topics in nonlinear programming.

841. Linear Statistical Models

Fall. 4(4-0) 443 or 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) 441 or 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) 852.

Continuation of 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 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) 861; MTH 425 or 428 or concurrently.

Continuous probability models, density transformations, some special continuous distributions, limit laws. Introduction to statistical inference, estimation of parameters, hypothesis testing.