

927. Comparative Nutrition — Protein Metabolism and Developmental Biology

Winter of even-numbered years. 4(4-0)
BCH 452, PSL 802 or concurrently. Interdepartmental with Animal Husbandry Department. Protein quality assessment, protein status, protein calorie malnutrition, amino acid metabolism, protein turnover, digestion and absorption, hormonal control of protein metabolism, developmental aspects of protein metabolism and growth.

928. Comparative Nutrition — Minerals

Spring of even-numbered years. 3 credits. BCH 452, PSL 802. Interdepartmental with and administered by the Animal Husbandry Department.

Forms and location in body, metabolic roles, deficiency and toxicity signs, interrelationships, requirements and biological availability of sources.

929. Comparative Nutrition — Vitamins

Spring of odd-numbered years. 3(3-0)
BCH 452 and a previous course on principles of nutrition. Interdepartmental with and administered by the Animal Husbandry Department.

Chemical and physical properties, standards of activity, occurrence, metabolic roles, antivitamin deficiencies and toxicity signs, requirements and factors affecting requirements.

999. Research

(F N 999.) Fall, Winter, Spring, Summer. Variable credit. Approval of department.

FOOD SYSTEMS ECONOMICS AND MANAGEMENT

See Agricultural Economics

FOREIGN LANGUAGES

See German and Russian, Linguistics and Oriental and African Languages, and Romance Languages.

FORESTRY FOR

College of Agriculture and Natural Resources

IDC. Resource Ecology and Man

For course description, see Interdisciplinary Courses.

202. Introduction to Forestry

Fall. 3(3-0)

Forestry in its broadest sense, including: historic development, forest growth, protection and management, products, national and world economy and policy. Emphasis on multiple use concepts. One-day field trip required.

204. Forest Vegetation

Fall, Spring. 5(3-4) BOT 205 or approval of department.

Nomenclature, classification, and identification of important trees, shrubs, and herbaceous plants of forest and field.

220. Plants and Their Environment

Winter. 3(3-0) Interdepartmental with Natural Resources.

Fundamental ecological relationships between various climatic, edaphic and biotic environmental factors of the ecosystem and plant response, including structure, function and evaluation of species.

301. Quantitative Methods for Natural Resources

Fall. 4(3-2) MTH 109 or 111.

Collection and analysis of information pertaining to natural resources. Survey design, field procedures, equipment, and analytical techniques.

305. Silviculture

Fall. 4(3-3) 204.

Interrelationships of trees of the forest community and the environment; natural and artificial forest reproduction methods; intermediate cuttings; field studies of silvicultural conditions.

306. Forest Fire Protection and Use

Winter. 3(3-0) Juniors or approval of department.

Causes and effects of forest fires. Combustion, fire behavior, and fire weather. Prevention and control planning and techniques. Use of fire in forest land management. One-day field trip required.

309. Wood Technology

Fall. 4(3-3)

Structure of wood. Mechanical and physical properties of wood. Wood anatomy and relation to growth.

319. Forestry Today

(419.) Winter. 3(3-0) Not open to majors.

For the non-forestry student, emphasizing multiple use of forests, scope and practice of forestry, environmental roles of forests, influences, products, non-timber uses of forests and current forest policy.

402. Forest Inventory

(302.) Winter. 3(2-3) 301 or approval of department.

Field and office techniques of forest inventory, with primary emphasis on timber resources.

409. Forest Hydrology

Fall. 3(3-0) SLS 210.

Hydrologic cycle, with emphasis on soil, water and ground water regimes; instrumentation and measurement of the various components. Effects of forest management on watersheds and water yields.

410. Forest Tree Improvement

Fall. 3(2-2)

Distribution of genetic variation in natural tree populations. Introduction, selection, progeny testing, species hybridization, and polyploidy to obtain superior tree populations.

411. Tree Physiology

Fall. 3(3-0) BOT 301.

The fundamental principles of plant physiology with particular reference to the growth and development of woody plants, and consideration of the influence of genetic and environmental factors on physiological processes in trees.

424. Forest Soils

Spring. 4(3-3) 220; SLS 210. Interdepartmental with Soil Science.

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. Manufacture of Lumber and Composite Wood Products

Spring. 3(3-0) 309.

Log and lumber grades, sawmill equipment and practices. Wood working machinery. Gluing of wood. Manufacture of pulp, plywood and other board products.

431. Law and Resources

Spring. 3(3-0) RD 417 or BIO 440. Interdepartmental with and administered by the Department of Resource Development.

Legal theories, cases, statutes and constitutional considerations are applied to natural resource utilization. Private and public property interests in natural resources are illustrated through case studies of use conflicts.

432. Methods in Wood Science

Spring. 3(2-2) 309.

Application of standard laboratory testing procedures to the evaluation of basic properties of solid wood and wood products. Laboratory exercises in wood microtechnique and wood finishings.

446. Range Management

Winter. 4(3-3) 220 or approval of department.

Development of range industry; grazing regions and reconnaissance; planning multiple-use management on forest range and watershed.

449. Field Studies in Forestry

Fall. 3 credits. 402, 305.

Multiple use forest resource management in various forest regions. Two-week field trip required, prior to the fall term of the senior year.

450. Natural Resource Administration

Fall, Spring. 4(4-0) Seniors. Interdepartmental with the departments of Fisheries and Wildlife, Parks and Recreation Resources and Resource Development and Natural Resources.

Concepts and methods of administering wildlife properties. The legal, economic and social environment. Benefit-cost analysis of management changes. Unit organization, personnel management and accounting. Presents a systems view of administration.

454. World Forestry

Winter. 3(3-0)

Forest resources, forestry practices, and the forest economy throughout the world.

455. Forestry Economics

Winter. 4(3-2) 450 or approval of department.

Basic economic and political principles and techniques that govern the production and consumption of forest land products, including basic forest valuation procedures.

457. Forest Management and Utilization Planning

Spring. 5(4-2) 455.

Integrative planning for forest management, including multiple-use aspects and timber harvesting systems.

460. Arboriculture

Spring. 3(2-3) Approval of department.

Principles and techniques of species selection, establishment, and cultural practices used in the care and maintenance of shade and ornamental trees. Two-day field trip required.

465. Forest and Wood Science Problems

Fall, Winter, Spring, Summer. 1 to 5 credits. Seniors with a 2.80 average, or approval of department.

Special problems course for students qualified for advanced study in some phase of forestry or wood science.

**Descriptions — Forestry
of
Courses**

491. Natural Resources and Modern Society

Spring, Summer. 3(3-0) Juniors. Interdepartmental with the Resource Development Department and Natural Resources.

A survey of the social and economic significance of natural resources in modern industrial and urban society. Current problems of natural resources management and use are examined in terms of the society in which they exist.

807. Special Problems

Fall, Winter, Spring, Summer. 2 to 5 credits. May re-enroll for credit with a maximum of 10 credits.

Advanced study in administration, biometrics, photogrammetry, dendrology, silviculture, management, economics, ecology, genetics, arboriculture, hydrology, soils, recreation, physiology, policy, entomology, products harvesting, wood preservation, timber mechanics, wood conversion, fire, range management, extension and pathology.

809. Natural Resources Economics

Winter. 3(3-0) Approval of department. Interdepartmental with the Resource Development Department.

Applications of economic analysis to natural resource problems.

828. Seminar

Winter. 1(1-0)

Critical study and discussion of advanced forestry topics.

830. Physiological Genetics

Winter. 3(3-0) Approval of department. Interdepartmental with Crop Science.

Physiological bases for genetic variation in higher plants including adaptive physiology, quantitative genetics, growth correlations, biochemical genetics, hybrid physiology, and geneecology.

840. Recreation Economics

Spring. 4(4-0) 809 or approval of instructor. Interdepartmental with the departments of Park and Recreation Resources and Resource Development and administered by the Department of Park and Recreation Resources.

Applications of economic analysis to recreation resource problems including measurement of demand and supply, valuation of recreation resources, determination of economic impact, economic decision making and policy considerations.

850. Administering the Public Land Agency

Spring. 4(4-0) 450 or approval of department.

Case studies of administrative problems in land management agencies. Students are organized as teams and prepare team reports on specified aspects of each case.

855. Research Methods

Fall. 3(3-0) Approval of department. Interdepartmental with and administered by the Resource Development Department.

Research techniques applicable to management, and policy-oriented natural resource investigations. Analysis of project designs; preparation of project proposals. Evaluation of representative published research studies.

899. Research

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

909. Timber Economics

Fall of odd-numbered years. 3(3-0) 457, 809, EC 800, 801, 802.

Economic theory relevant to study of timber production, regional and national timber supply, demand and price, the effect of institutional factors, and other topics by review of past research.

910. Resource Economics Proseminar

Spring. 3(3-0) May re-enroll for a maximum of 9 credits. Approval of department. Interdepartmental with the departments of Agricultural Economics and Resource Development.

A seminar wherein advanced graduate students in the fields of resource economics participate with faculty in the joint conduct of a major research project in resource economics and policy.

960. Simulation Models in Natural Resource Management

Winter of odd-numbered years. 3(3-0) 855 and knowledge of FORTRAN programming or approval of department. Interdepartmental with and administered by the Department of Resource Development.

The role of simulation models in developing management strategies. Applications of computer simulation in natural resources. Modeling of decision systems in natural resources management.

999. Research

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

FRENCH

See Romance Languages

GENETICS

College of Natural Science

800. Genetics Seminar

Fall, Winter, Spring. 1(1-0) May re-enroll for a maximum of 12 credits. Approval of director.

Student seminar to cover genetics subjects not considered in formal courses. Course is also intended to give students experience in reviewing and organizing literature in a subject, and orally presenting and defending the analysis.

801. Molecular Genetics

Fall. 3(3-0) ZOL 441 or approval of instructor.

Molecular genetics. Chemical nature of the gene, inter- and intra-genetic recombination, genetic organization and gene action.

802. Population and Quantitative Genetics

Winter. 3(3-0) ZOL 441, or approval of instructor.

Genetics of quantitative characteristics in populations with special reference to polygenic variation and its interactions with environment, gene action and its measurement, mating systems, and selection.

803. Modern Genetics in Evolution

Spring. 3(3-0) ZOL 441 or approval of instructor.

Genetic basis of evolution. Cellular, chromosomal, and mutational bases of genetic variability. Natural selection and protein variations. Diversity of evolution.

880. Special Problems

Fall, Winter, Spring, Summer. 1 to 4 credits. May re-enroll for a maximum of 12 credits. Approval of instructor.

Students with special interests and abilities may study published literature in a selected genetics topic or they may carry on research in the laboratory on a selected subject in collaboration with genetics faculty.

890. Selected Topics in Genetics

Fall, Winter, Spring, Summer. 2 to 5 credits. May re-enroll for a maximum of 9 credits. ZOL 441 and approval of instructor. Topics will be selected from molecular genetics, physiological genetics, population genetics, quantitative genetics, evolution, radiology and mutagenesis, microbial genetics, somatic cell genetics, behavioral genetics, and human genetics.

999. Research

Fall, Winter, Spring, Summer. 3 to 12 credits. Majors.

Research for the doctoral dissertation in genetics.

GEOGRAPHY

GEO

College of Social Science

Courses are classified as follows:

- Cultural—170, 201, 404, 801, 901.
- Economic—213, 409, 412, 413, 435, 454, 806, 807, 809, 835, 906.
- Field Techniques—415, 850.
- Geographic Education—458, 858.
- Historical—310, 810, 910.
- Independent Research—400H, 411, 480, 818, 899, 918, 999.
- Medical—470, 870, 970.
- Physical—206, 206L, 429, 430, 431, 432, 451, 834, 902.
- Political—170, 416, 808, 908.
- Population—215, 320, 836, 934.
- Quantitative Methods—427, 428, 811.
- Regional—204, 300, 315, 316, 319, 321, 322, 340, 342, 350, 360, 361, 362, 363, 364, 812, 912.
- Recreational and Environmental—307, 309, 828.
- Theory and Philosophy—150, 280, 425, 480, 825, 826, 827.
- Urban—318, 401, 402, 403, 805.
- Visual Media and Techniques—122, 223, 224, 424, 426, 436.

100. Man, Location and Environment

Fall, Spring. 3(3-0) Primarily for non-majors.

Concepts, theory and methods of modern geography.

122. The World of Maps

(222.) Fall. 3(3-0)

Discussion of types, practical applications, and sources of maps.

150. Geography of Selected Current Problems

Winter. 2(2-0)

The geographic perspective is used to examine U. S. and world problems of major concern such as international conflicts, environment quality, spatial change, and economic development.

170. Future Worlds

Fall, Spring, Summer. 2(2-0)

Geographical approach to environmental, biological, economic, social and political problems facing mankind between now and year 2000.

IDC. Resource Ecology and Man

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