

- 453. Readings in Nutrition**
Winter. Summer of odd-numbered years. 3(3-0) 452 or approval of department. A study of recent developments in research in human nutrition.
- 454. Recent Advances in Foods**
Spring. 3(3-0) 403.
Critical analysis of recent developments in preparation, prefabrication and preservation of foods.
- 461. Human Nutrition I**
Fall. 4(2-2) BCH 200; PSL 332 or 241.
Metabolism of protein, fats and carbohydrates, as applied to nutritional requirements and food supplies of people.
- 462. Human Nutrition II**
Winter. 4(2-2) 461.
Metabolism of vitamins and minerals as applied to the nutritional requirements and food supplies of people.
- 463. Human Nutrition III**
Spring. 4(3-2) 462.
Critical analysis of methods used in assessing human nutrition status; evaluation of nutritional problems of current interest.
- 464. Diet Therapy**
Spring. 4(2-2) 462 or concurrently.
Dietary modifications necessary in pathological conditions, including dietary treatment of diabetes, gout, nephritis, and gastro-intestinal disorders.
- 800. Seminar in Foods and Nutrition**
Fall, Winter, Spring. 1(1-0) 403 or 463.
- 805. Experimental Foods III**
Spring. 4(1-9) 404 or approval of department.
Planning, executing, and reporting individual research project. Data collection, evaluation and interpretation to demonstrate understanding of research techniques and attitudes, and an awareness of significant problems in the field.
- 813A. Special Studies in Nutrition**
Fall, Winter, Spring, Summer. Variable credit. 461.
- 813B. Special Studies in Experimental Foods**
Fall, Winter, Spring. Summer of odd-numbered years. Variable credit. 404; BCH 200 or 803 and 804.
- 816. Applied Human Nutrition**
Spring. 3(3-0) 462.
- 825. Techniques in Nutrition Research**
Winter of odd-numbered years. 1 to 3 credits. CEM 333; approval of department. Interdepartmental with and administered by the Animal Husbandry Department.
Use of specialized instruments and techniques. Laboratory safety. Management of laboratory animals. Development of abilities in areas of particular interest to individual students.
- 899. Research**
Fall, Winter, Spring, Summer. Variable credit. Approval of department.
- 927. Comparative Nutrition I**
Winter. 2 or 4 credits. BCH 402; PSL 502 or concurrently. Interdepartmental with the Animal Husbandry Department.
Mammalian nutrition based on biochemical and physiological phenomena. Proteins are studied in the first half of the term; carbohydrates, fats and macro-minerals in the last half.

- 928. Comparative Nutrition II**
Spring. 2 or 4 credits. BCH 402; PSL 502. Interdepartmental with and administered by the Animal Husbandry Department.
Mammalian nutrition based on biochemical and physiological phenomena. Micro-minerals are studied in the first half of the term; vitamins in the last half.
- 999. Research**
Fall, Winter, Spring, Summer. Variable credit. Approval of department.

FOREIGN LANGUAGES

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

FORESTRY

College of Agriculture and Natural Resources

- 200. Resource Ecology and Man**
For course description, see Interdisciplinary Courses.
- 202. Introduction to Forestry**
(101.) 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. Dendrology**
Spring. 6(4-6) BOT 301, 302, 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)
Fundamental ecological relationships between various climatic, edaphic and biotic environmental factors of the ecosystem and plant response, including structure, function and evaluation of species.
- 302. Forest Biometrics**
Fall. 5(4-3) 204; C E 251; MTH 112.
Principles of measurement, sampling methods, and statistical techniques used in forest management and research.
- 305. Silvics and Silviculture**
Fall. 5(4-3) 204.
Interrelationships of trees of the forest community and the environment; plant succession; statistical methods of community analysis; natural and artificial forest reproduction methods; intermediate cuttings; field studies of silvicultural conditions.
- 306. Forest Fire Protection and Use**
Spring. 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.

FOR

- 309. Wood Technology**
(F P 309.) Winter. 4(2-6)
Structure of wood. Mechanical and physical properties of wood. Wood anatomy and relation to growth.
- 348. Forest Regulation and Valuation**
Winter. 3(3-0) 302, 305.
Principles of organizing and regulating forest properties; basic forest valuation procedures.
- 409. Forest Hydrology**
Winter. 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(2-3)
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.
- 419. Woodland Forestry**
Fall, Spring, Summer. 3(2-2) Not open to majors.
Management of small woodlands. Tree identification; forest planting; improvement cutting and harvesting methods; forest measurements; use and marketing of forest products; other uses. One-day field trip required.
- 424. Forest Soils**
Spring. 4(3-3) 220; SLS 210. Interdepartmental with the Soil Science 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. Lumber Processing**
(F P 310.) Fall. 3(3-0) 309.
Log and lumber grading. Sawing practices, mill layout. Planing mill. Planers and planing. Air and kiln drying of lumber; kiln schedules. Two field trips required.
- 431. Fiber and Laminated Wood Processing**
(F P 410.) Spring. 3(3-0) 309.
Wood adhesives. Gluing of wood. Technology and manufacture of plywood, laminated structural members, particleboard and fiberboards. Pulp and paper products. One two-day field trip required.
- 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. 5 credits. 348.
Intensive study of multiple use forest resource management in various forest regions. Three-week field trip required.

450. Natural Resource Administration
Fall, Winter. 4(4-0) *Interdepartmental with the Fisheries and Wildlife, Park and Recreation Resources, and Resource Development Departments.*

Concepts and methods of economics and administration and application of techniques to management of wildlands.

454. World Forestry
Winter. 4(3-0)

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

455. Harvesting Forest Products
(421.) Winter. 3(2-2) 450.

Planning, organizing, and controlling the utilization of timber resources, including cost control in timber harvesting systems.

456. Forest Resource Policy
(452.) Spring. 3(3-0) 455 or approval of department.

Evolution and development of public and private forest resource policy in the United States.

457. Forest Resource Planning
Spring. 4(2-2) 455.

Integrative planning for multiple-use forest resource management.

460. Arboriculture
(360.) 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.

806. Forest Research Methods
Fall. 3(3-0)

Procedures in systematic and objective investigation of natural phenomena; methods of critical and exhaustive experimentation aimed at discovering new facts, theories, or laws.

807. Special Problems
Fall, Winter, Spring, Summer. 2 to 5 credits. *May re-enroll for credit with a maximum of 10 credits for the master's degree.*

Advanced work in any of the following specialties: forest biometrics; forest photogrammetry; dendrology; silviculture; forest management; forest economics; forest influences; forest ecology; forest genetics; arboriculture; forest hydrology; forest soils; forest recreation; tree physiology; forest policy; forest products harvesting; wood chemistry; wood preservation; timber mechanics; wood conversion.

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
Fall, Winter, Spring. 1 to 3 credits. *May re-enroll for a maximum of 12 credits if a different topic is taken.*

Critical study and discussion of advanced forestry topics including natural resource economics, forest biology, and natural resource program budgeting.

830. Physiological Genetics
Winter. 3(3-0) *Approval of department. Interdepartmental with the Crop Science Department.*

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

851. Public Program Budgeting
Fall. 3(3-0) *Approval of department. Interdepartmental with the Resource Development Department.*

Survey of the federal government's planning-programming-budgeting system, stressing executive branch budget decision-making and budget administration in the natural resource bureaus.

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

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

FRENCH

See Romance Languages

GEOGRAPHY GEO

College of Social Science

Courses are classified as follows:

- Introductory
- A. Sequence designed as an introduction to cultural and physical geography: 204, 206.
 - B. One-term cultural introduction: 204.
 - C. One-term physical introduction: 206.
- Physical—206, 206L, 305, 430, 431, 432, 902.
Economic and Land Use—213, 308, 309, 312, 413, 806.
Historical and Cultural—310, 401, 810.
Methodology and Theory—425, 816.
Political—416, 808.
Population, Settlement, and Urban—318, 320, 804.
Regional—204, 300, 390, 391, 405, 406, 407, 408, 418, 420, 440, 441, 450, 460, 461, 462, 879, 912.
Techniques and Research—222, 223, 324, 400H, 411, 415, 424, 426, 427, 814, 818, 899, 918, 999.

200. Resource Ecology and Man
For course description, see Interdisciplinary Courses.

204. World Regional Geography
Fall, Winter, Spring, Summer. 4(3-0)
Regional analysis of the countries of the world, including their cultural and natural aspects.

206. Physical Geography
Fall, Winter, Spring, Summer. 4(4-0)
Principal earth surface elements of physical geography including weather, climate, landforms, soils, water and biotic resources, in their genetics, distributional and functional interrelationships.

206L. Physical Geography Laboratory
Fall, Winter, Spring. 1(0-2) 206 or concurrently.
Laboratory study of geographic aspects of map interpretation, aerial photographs, weather, climate, soils, landforms, and vegetation.

213. Economic Geography
Fall, Winter, Spring, Summer. 3(3-0)
Primary emphasis on world distribution of manufacturing industries and their raw materials. Factors of industrial location stressed.

222. The World in Maps
Fall. 3(3-0)
Nature, significance, and evolution of maps from ancient times to the present including types, sources and uses of maps, and contributions of major cartographers.

223. Elementary Cartography and Graphics
Fall, Winter. 4(2-4)
Principles and techniques of constructing maps and other graphic devices; types of map reproduction; application of quantitative methods and recent developments to map drawing.

300. Geography of North America
Fall, Winter, Summer. 3(3-0) or 5(3-0)
Human and physical geography of North America, north of the Mexican border.

305. Landforms of North America
Winter. 3(3-0) 206 or GLG 201.
Description and interpretation of the surface configuration of the United States and Canada.

308. Geography of World Trade and Transportation
Fall. 3(3-0)

Major localities involved in world trade. Principal carriers of trade, main overland and oceanic routes used by commerce, types and volume of commodities. Spatial theory of trade and transportation.

309. Recreational Land Use
Spring. 3(3-0)
Survey of recreational land use in the United States including analysis of resources basic to such land use and their distribution.

310. Historical Geography of the United States
Spring, Summer. 3(3-0) or 5(3-0)
Reconstruction of geographies of the United States as they existed in the past.

312. Geography of Agriculture
Winter. 3(3-0)
Analysis of the nature, importance and world distribution of agriculture, some attention to commercial fisheries and forest exploitation.

318. Cities of the World
Winter, Summer. 3(3-0) or 5(3-0)
World distribution of cities, their functions and relationship of function to the immediate and regional area; systems of urban land classification and geographic aspects of forces affecting urban land use.

320. Geography of World Population
Spring. 3(3-0)
A regional approach to world population in relation to geographical factors including coverage of such topics as numbers, densities, growth rates, and distributional patterns.

324. Aerial-Photo Interpretation
Fall. 4(2-4) *Sophomores.*
Use of photographs in geographic investigation and map construction with particular reference to identification of natural and cultural features. The significance of new developments in the field such as unconventional imagery and electronic sensing are introduced.

390. Survey of Sub-Saharan Africa
For course description, see Interdisciplinary Courses.