

421. Electrical Energy Utilization
Spring. 4(3-2) PHY 238 or approval of department.

Efficient utilization of electrical energy; selection, operation and control of electrical equipment. Design of electrical systems.

431. Irrigation, Drainage and Erosion Control Systems
Spring. 4(3-2) CSS 210 or approval of department.

Use of surveying, design, construction and cost estimates of drainage irrigation and water control systems.

436. Microclimatology
Winter. 3(3-0) MTH 108; GEO 351 recommended. Interdepartmental with the Department of Geography.

Physical environment in the lower few hundred meters of the atmosphere and within the biosphere.

443. Machinery and Tractor Systems
Fall. 4(3-2) AET 243 or approval of department.

Characteristics of basic agricultural field machinery. Diesel engine, fuel injection and combustion chamber characteristics. Torque and power transmission, tractor stability and implement hitching.

480. Special Problems
Fall, Winter, Spring, Summer. 1 to 5 credits. May reenroll for a maximum of 5 credits. Approval of department.

Individual student research and study in: agricultural machines and tractors, waste management, food processing, structures and environment, materials processing and handling, water management, meteorology and climatology, agricultural systems analysis.

804. Agricultural Mechanization in Developing Countries
Spring. 3(3-0) Approval of department.

Appropriate agricultural mechanization with emphasis on hand, animal, and mechanical equipment for the smaller farms. Machine selection, local manufacturing, public and private costs, ownership patterns; increasing production and decreasing post production losses.

806. Analysis of Agricultural Systems
Winter. 3(3-0) SYS 810.

Identification and definition of systems problems in agriculture. Model formulation and estimation. Several models of current interest are considered.

807. Human Factors Engineering
(A E 807.) Fall. 3(3-0) Approval of department.

Analysis of machine design, operation and working environment in relation to human limitations and capabilities, analysis of procedures used to develop maximum compatibility between people and machine.

808. Environmental Measurements
(AET 805.) Spring. 4(3-3) Approval of department. Interdepartmental with the Department of Geography.

Methods and techniques for accurate measurement and interpretation of environmental parameters. Temperature, humidity, wind and air flow characteristics, radiation, light intensity, gaseous and particulate concentrations in atmospheric microclimates will be discussed.

899. Master's Thesis Research
Fall, Winter, Spring, Summer. Variable credit. May reenroll for a maximum of 15 credits. Approval of department.

999. Doctoral Dissertation Research
Fall, Winter, Spring, Summer. Variable credit. May reenroll for a maximum of 36 credits. Approval of department.

Building Construction B C

200. Dynamics of American Housing
Fall, Winter, Spring, Summer. 3(3-0)
Impact of housing on the economic and social welfare of America. Analysis of the residential building industry and its problems in providing adequate housing.

215. Architectural Drafting I
Fall, Summer. 4(2-4)
Residential design including site plans, floor plans, foundation plans, elevations, sections and details.

216. Architectural Drafting II
Winter, Summer. 4(2-4) B C 215.
Light commercial design including site plans, floor plans, foundation plans, elevations, sections and details, barrier free accessibility.

239. Housing Conservation
(AET 239.) Spring. 3(3-0) Interdepartmental with the Department of Human Environment and Design.
Skills and techniques in conserving, repairing and remodeling existing housing. Structural components of housing and evaluation of housing structure.

312. Structural Design
Winter. 4(5-0) PHY 237.
Consideration of structural design systems as used in light construction.

412. Housing Utilities Design
Winter. 4(4-0) PHY 238, EGR 463 or approval of department.
Design of and planning for mechanical and electrical utilities in housing.

413. Residential Construction Systems
Spring. 4(3-2) PHY 239, B C 312 or approval of department.
Analysis of the primary construction systems employed in the residential building industry, especially the economic and social aspects in meeting the housing goals of the U. S.

415. Building Materials
Spring. 4(4-0) PHY 239, B C 312 or approval of department.
Properties of building materials pertinent to their application and performance in service.

416. Building Costs
Fall. 4(2-4) EGR 364 or approval of department.
Methods of cost estimating. Effects of codes and production practices on costs.

417. Residential Finance
Winter. 4(4-0) AFA 395 or approval of department.
Analysis of financial programs for the construction, rehabilitation, remodeling and purchase of homes; especially meeting the nation's goals for low to moderate income housing.

418. Special Problems
Fall, Winter, Spring, Summer. 1 to 4 credits. May reenroll for a maximum of 11 credits. Written approval of department.

Special problems in the areas of acquisition and development of residential land, design, construction technology, building materials, finance, marketing, construction management and land use codes and regulations.

420. Construction Management
Spring. 4(4-0) Senior majors or approval of department.

Systems management techniques for residential building organizations inclusive of organization development, operations, planning, scheduling and control, and administrative systems and procedures.

835. Research in Building Construction
Fall, Winter, Spring, Summer. 1 to 16 credits. May reenroll for a maximum of 16 credits. Approval of department.

880. Special Problems
Fall, Winter, Spring, Summer. 1 to 4 credits. May reenroll for a maximum of 9 credits. Approval of department.

Individual student research and study in land acquisition and development, design, construction, management, finance, marketing, and structural analysis.

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

AGRICULTURAL ENGINEERING TECHNOLOGY

See Agricultural Engineering.

AGRICULTURE AND NATURAL RESOURCES ANR

College of Agriculture and Natural Resources

220. Plants and Their Environment
(N R 220.) Winter. 3(3-0) Interdepartmental with and administered by the Department of Forestry.

Relationships between plants and fundamental climatic, edaphic, and biotic factors; structure and function of different ecosystems in relation to environmental factors.

275. Exploring International Agriculture
(AG 275.) Spring. 3(3-0)

Exploration of overseas assignments with international agencies; potential world food actualities and potentialities; special problems of the tropics compared with those in temperate regions.

280. Selected Topics
Fall, Winter, Spring, Summer. 1 to 4 credits. May reenroll for a maximum of 6 credits if different topics are taken. Approval of department.

Descriptions - Agriculture and Natural Resources

of Courses

- 341. Energy in the Food System**
(AG 341.) Winter. 3(3-0) Juniors or approval of department. Interdepartmental with and administered by Agricultural Engineering Technology.
Energy flow in the food system. Conversion principles and processes—solar, engines, fertilizers, pesticides, electrical, waste heat utilization. Environmental considerations, economic and social implications related to the food system. Alternatives. Conservation.
- 350. Leadership Development for Agriculture and Natural Resources**
(AG 350.) Winter, Spring. 3(3-0) May reenroll for a maximum of 6 credits. Approval of department.
Leadership development. Preparation for community leadership. Firsthand look at social, economic, and political problems. Series of seminars, interviews, field trips. Emphasis on awareness, action, and involvement. Field trips required.
- 399. Professional Internships in Agriculture and Natural Resources**
(AG 399.) Fall, Winter, Spring, Summer. 6 to 12 credits. May reenroll for a maximum of 12 credits. Juniors and approval of department.
Professionalized experiences in a student's major. Supervision and evaluation by faculty and cooperating agencies.
- 401. Agriculture and Natural Resources Communications**
(AG 401.) Fall, Winter, Spring. 3(2-2) JRN 201 or other writing course and approval of department.
Techniques, strategies and practices in development of agricultural and natural resources information programs. Including writing, public relations, TV and radio production for specialized and general audiences.
- 402. Agriculture and Natural Resources Communications Internship**
(AG 402.) Fall, Winter, Spring, Summer. 1 to 6 credits. May reenroll for a maximum of 6 credits. ANR 401, approval of college.
Internship with professionals in communications field with emphasis on student's areas of interest—writing, radio, TV, publications, etc.
- 410. Environmental Toxicology**
(AG 410.) Winter. 4(4-0) B S 212, BCH 401. Interdepartmental with and administered by the College of Natural Science.
Fate and effects of toxic chemicals in soil, plants, wildlife, and aquatic systems. Interactions between chemicals and the environment which influence their fate and ecological importance.
- 425. Agriculture and Natural Resources Seminar**
(AG 425.) Spring. 2(2-0)
Current agricultural, natural resources, and environmental problems and solutions as presented by discussion leaders from various disciplines, arranged by undergraduate students.
- 444. Pest Management I: Systems Management for Plant Protection**
(AG 444.) Fall. 4(3-2) FSM 200 or EC 201. Interdepartmental with and administered by the College of Natural Science.
Designed to integrate knowledge and improve ability in arriving at pest management decisions of varying complexity involving the fields of agronomy, wildlife, horticulture, entomology, and plant pathology.
- 445. Pest Management II: Pesticide Chemistry and Application Systems for Plant Protection**
Winter. 5(3-4) CEM 132. Interdepartmental with and administered by the College of Natural Science.
A broad overview of pesticide chemistry, efficient usage, environmental fate, legislation and application techniques.
- 446. Pest Management III: Biological Systems for Plant Protection**
Spring. 3(3-0) ENT 425, BOT 405, HRT 402 or CSS 402. Interdepartmental with and administered by the College of Natural Science.
Management of plant pests utilizing host resistance, cultural practices, legislation, and biological systems.
- 450. Natural Resource Administration**
(N R 450.) Winter. 4(4-0) Seniors; not open to forestry majors. Interdepartmental with the departments of Fisheries and Wildlife, Forestry, Park and Recreation Resources and Resource Development. Administered by the Department of Forestry.
Concepts and methods of administering wildland 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.
- 455. Natural Resource Economics**
(N R 455.) Fall. 4(4-0) Approval of department. Interdepartmental with the departments of Fisheries and Wildlife, Forestry, Park and Recreation Resources and Resource Development. Administered by the Department of Forestry.
Basic economic and political principles and techniques that govern the production and consumption of forest land products, including basic forest valuation procedures.
- 462. Agricultural and Rural Development in Developing Nations**
(AG 462.) Fall. 3(3-0) PAM 201 or EC 201; PAM 260 recommended. Interdepartmental with Public Affairs Management, and Food Systems Economics and Management. Administered by Food Systems Economics and Management.
Traditional agricultural systems and the incentive environment for economic growth in rural areas. Adjustment to technological, institutional and human change. Strategies for rapid agricultural transformation.
- 475. International Studies in Agriculture and Natural Resources**
(AG 475.) Spring, Summer. 3 to 9 credits. Approval of college.
Study-travel experience emphasizing contemporary problems affecting agriculture in the world, national, and local communities. Field trips, case studies, interviews with leading experts, government officials, community leaders. Supervised individual study.
- 480. Selected Topics**
Fall, Winter, Spring, Summer. 1 to 4 credits. May reenroll for a maximum of 9 credits if different topics are taken. Approval of department. Juniors.
Exposition of special topics in agriculture and natural resources.
- 491. Natural Resources and Modern Society**
(N R 491.) Spring. 3(3-0) Juniors. Interdepartmental with the departments of Forestry, and Resource Development. Administered by the Department of Forestry.
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.
- 821. Agricultural Education in Rural Development**
(ED 821F.) Winter. 3(3-0) Approval of department.
Agricultural education at various levels and in different forms for rural development. Formal and non-formal education: planning, conducting and evaluating. Case studies from selected developing countries.
- 826. Methods of Teaching Agricultural Mechanics**
(ED 830G.) Fall of odd-numbered years. 3(3-0) Approval of department.
Methods of instruction including program planning, scheduling, use of teaching aids, management of buildings, facilities and equipment; the selection, organization, and evaluation of activities in farm mechanics.
- 828. Teaching Farmer Classes in Agriculture**
(ED 828B.) Fall of even-numbered years. 3(3-0) Approval of department.
Objectives of adult education in agriculture, organizing and promoting classes, course planning, instructional procedures, follow-up and evaluation.

AMERICAN STUDIES AMS

College of Arts and Letters

- 301. Issues in American Civilization**
Fall. 3(3-0) May reenroll for a maximum of 9 credits. Sophomores.
Selected issues in American life past and present, with materials drawn from such disciplines as history, social sciences, philosophy, literature and the arts. Topics vary.
- 378. Popular Culture and Technical Change**
Winter. 4(4-0) Juniors or approval of department. Interdepartmental with and administered by Lyman Briggs School.
Interrelationships among elements of mass culture and technical change. Introduction to relevant research methods.
- 410. Perspectives in American Studies**
Winter. 3(3-0) Juniors, approval of American Studies adviser.
Methods and significant works, for majors in the American Studies program. Offered by members of the relevant departments.