

**Descriptions — Agricultural Engineering  
of  
Courses**

**477. Thermal Process Engineering**  
Winter. 3(2-2) F E 475.

Thermal processing of biological materials. Thermal death kinetics, pasteurization and sterilization. Thermobacteriology. Food reaction kinetics. Food reactor design. Thermal process evaluation. Aseptic processing.

**487. Food Engineering Design**

Winter. 3(3-0) F E 477 or concurrently; A E 486.

Design and scale-up of food processes and equipment. Process and product specifications. Engineering feasibility studies. Prediction of process performance, quality, efficiency, and manufacturing cost.

**AGRICULTURAL  
TECHNOLOGY AND  
SYSTEMS MANAGEMENT**

See Agricultural Engineering.

**AGRICULTURE AND NATURAL  
RESOURCES ANR**

**College of Agriculture and Natural  
Resources**

**220. Plants and Their Environment**

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**

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.

**350. Leadership Development for  
Agriculture and Natural Resources**

Winter, Spring: 3(3-0) Given at W. K. Kellogg Biological Station Fall, Spring: 3 credits. 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**

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.

**410. Environmental Toxicology**

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. Approved through Fall 1989.

**425. Agriculture and Natural Resources  
Seminar**

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.

**445. Pest Management: Pesticide  
Chemistry and Application  
Systems for Plant Protection**

Fall. 5(3-4) CEM 143, ENT 425, HRT 402 or CSS 402, BOT 405 or concurrently or approval of instructor. 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: Biological  
Systems for Plant Protection**

Fall. 3(3-0) ENT 425, HRT 402 or CSS 402, BOT 405 or concurrently or approval of instructor. Interdepartmental with and administered by the College of Natural Science.

Management of plant pests utilizing host resistance, cultural practices, legislation, and biological systems.

**447. Pest Management: Systems  
Management for Plant Protection**

(ANR 444.) Winter. 4(3-2) NSC 445, NSC 446 or approval of instructor. 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.

**450. Natural Resource Administration**

Spring. 4(4-0) Seniors. 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**

Fall. 4(3-2) EC 200 or EC 201. 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 institutional principles and techniques that govern the production and consumption of renewable natural resources. Natural resource evaluation, project analysis, and distributional considerations.

**462. Agricultural and Rural  
Development in Developing  
Nations**

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**

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**

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.

**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.

**377. The Natural Environment:  
Perceptions and Practices**

Fall. 4(4-0) Sophomores. Interdepartmental with Lyman Briggs School. Administered by Lyman Briggs School.

Factors which have influenced U.S. environmental attitudes as reflected in art and literature. Ways in which changing attitudes have led to changes in legislation and practice.

**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.