

- 432. Introduction to Meteorology**  
For course description, see Interdisciplinary Courses.
- 433. Introductory Meteorology Laboratory**  
For course description, see Interdisciplinary Courses.
- 435. Microclimatology**  
For course description, see Interdisciplinary Courses.
- 437. Principles of Food Engineering**  
Winter. 5(5-0) 220.  
Principles and use of electricity, steam, refrigeration and hydraulics in food plants. Emphasis will be placed on specialized processing equipment, their design features, materials of construction and automatic control.
- 443. Internal Combustion Engines**  
Fall, Spring. 3(2-2) 220.  
Introduction to spark ignition and compression ignition engines with emphasis on principles of operation, combustion, fuels, lubricants and engine performance.
- 444. Agricultural Production Machinery**  
Spring. 3(2-2) 220.  
Basic principles of agricultural machines. Selection, care and operation of agricultural machinery for obtaining optimum conditions for crop production.
- 445. Hydraulic Power Transmission**  
Winter. 3(2-2) MTH 111, PHY 237.  
Pressures, flows and losses in hydraulic power transmission systems. Operation and performance of pumps, valves, actuators, and complete systems found on agricultural and light industrial mobile equipment.
- 459. Special Problems**  
Fall, Winter, Spring, Summer. 1 to 5 credits. May re-enroll for a maximum of 5 credits. Approval of department.
- 462. Pollution Control**  
Winter of even-numbered years. 4(3-2) 352.  
Application of biological, chemical, physical and engineering principles of pollution control to optimize the production and processing of food and fiber with respect to the quality of the total environment.
- 471. Electric Power and Control**  
Fall. 4(3-2) E E 345.  
Electric motors, controls and circuits; switching logic, devices and circuit design.
- 474. Processing Biological Products**  
Winter of odd-numbered years. 4(3-2) 352, M E 311.  
Engineering principles of unsteady-state heat transfer, heat exchangers, drying, storage and refrigeration as applied to the processing of biological products.
- 475. Introduction to Operations Research**  
Winter. 4(4-0) MTH 215, CPS 120. Interdepartmental with Systems Science.  
Methodology and basics of operations research; formulation and analysis of probabilistic models of inventory, waiting line, and reliability processes; random process simulation and network planning models.
- 476. Food Process Engineering**  
Spring of odd-numbered years. 4(3-2) 352.  
Description and analysis of systems utilized in processing of foods for human consumption.
- 481. Soil and Water Engineering**  
Spring of even-numbered years. 4(3-2) M E 332 or C E 321.  
Engineering analysis, design and construction of drainage, irrigation and erosion control systems.
- 493. Energy Conversion Systems**  
Spring. 4(3-2) M E 311.  
Principles of energy conversion with emphasis on the internal combustion engine. Thermodynamic analysis, performance characteristics, and power transmission.
- 494. Systems of Agricultural Machines**  
Spring of even-numbered years. 4(3-2) 355.  
Systems of machines used in field and farmstead operations. Engineering principles for machines dealing with biological materials.
- 804. Agricultural Mechanization in Developing Countries**  
Spring. 3(3-0) Approval of department.  
Principles of mechanical equipment selection for organized agricultural enterprises. Machinery specifications and standards, performance efficiency, cost and use, and management factors. Domestic and foreign considerations.
- 805. Environmental Measurements**  
Fall. 4(3-3)  
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.
- 806. Analysis of Agricultural Systems**  
Spring. 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. Man-Machine Relationships**  
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 man and machine.
- 811. Technical Problems**  
Fall, Winter, Spring, Summer. 1 to 4 credits. May re-enroll for a maximum of 9 credits.
- 812. Bio-Processing Engineering**  
Winter. 3(3-0) Approval of department.  
Topics will be presented pertaining to thermodynamics, heat and mass transfer, thermal processing, fluid flow, dehydration and freeze drying of biological products or biological processes.
- 814. Physical Properties of Agricultural Products**  
Winter. 3(3-0) Approval of department.  
Physical and mechanical behavior of fruits and vegetables, forages, grains and other agricultural products under constant and dynamic loading. Related to design parameters for production, handling and processing machinery.
- 815. Instrumentation for Agricultural Engineering Research**  
Fall. 3(3-0)  
Theory, method and techniques of measuring temperature, pressure, flow, humidity, and moisture for biological materials. Associated recording and indicating equipment.
- 820. Research Methods in Agricultural Engineering**  
Fall. 1(1-0)  
Discussion of procedures for initiating, developing, carrying out, and completing research projects.
- 822. Seminar**  
Spring. 1(1-0)
- 840. Advanced Power and Machinery**  
Spring. 3(2-2) 493, 494.  
Analysis of agricultural machine components and systems. Emphasis on hydraulic power transmission, controls, and management of machinery systems.
- 899. Research**  
Fall, Winter, Spring, Summer. Variable credit. Approval of department.
- 990. Advanced Topics in Agricultural Engineering**  
Fall, Winter, Spring. 3(3-0) May re-enroll for a maximum of 9 credits. Approval of department.  
New developments in agricultural engineering. Subjects to be covered include atmospheric turbulence, optimization of agricultural systems, measurement systems, food engineering, and agricultural rheology.
- 999. Research**  
Fall, Winter, Spring, Summer. Variable credit. Approval of department.

## AGRICULTURE AG

## College of Agriculture and Natural Resources

- 275. Exploring International Agriculture**  
Spring. 3(3-0) Interdepartmental with Natural Resources.  
Exploration of overseas assignments with international agencies; potential world food actualities and potentialities; special problems of the tropics compared with those in temperate regions.
- 350. Leadership Development for Agriculture and Natural Resources**  
Winter, Spring. 3(3-0) May re-enroll for a maximum of 6 credits. Approval of department. Interdepartmental with Natural Resources.  
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.
- 401. Agriculture and Natural Resources Communications**  
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**

Fall, Winter, Spring, Summer. 1 to 6 credits. May re-enroll for a maximum of 6 credits. 401, approval of college.

Internship with professionals in communications field with emphasis on student's areas of interest — writing, radio, TV, publications, etc.

**425. Agriculture and Natural Resources Seminar**

Spring. 2(2-0) Interdepartmental with Natural Resources.

Current agricultural, natural resources, and environmental problems and solutions as presented by discussion leaders from various disciplines, arranged by undergraduate students.

**450. United States Agriculture for Overseas Students**

Fall. 3(3-0) Advanced undergraduate or graduate students from countries other than the United States or Canada.

Orientation course for overseas students. Development of United States agriculture. Institutions serving agriculture with emphasis on Land Grant University system. Scientific developments and their impact on agriculture. Field trips.

**462. Rural Transformation in Developing Societies**

Fall. 3(3-0) PAM 201 or EC 201; PAM 260 recommended. Interdepartmental with Public Affairs Management and Food Systems Economics and Management and 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.

**471. Environmental Topics in Nonmetropolitan Regions**

Fall. 4(4-0) Nomination of students by own department and approved by participating faculty. Interdepartmental with the College of Natural Science and Natural Resources and administered by Natural Resources.

Environmental topics in nonmetropolitan regions including issues on: production agriculture, service industries, non-agricultural uses, rural urban balance, discussion topics and case studies.

**475. International Studies in Agriculture and Natural Resources**

Spring, Summer. 3 to 9 credits. Approval of the college. Interdepartmental with Natural Resources.

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.

**488. The Impact of Animal Resource Management Upon the World's Developing Nations**

Winter. 3(4-0)  
For course description, see Interdisciplinary Courses.

**880. Soils and Land Use in Tropical and Subtropical Regions**

Spring. 3(3-0) Approval of department. Interdepartmental with and administered by Soil Sciences.

Problem oriented studies of soils and land use in the tropics and subtropics in relation to their genesis, morphology, taxonomy, and management.

**AMERICAN STUDIES AMS**

**College of Arts and Letters**

**301. Issues in American Civilization**

Fall, Winter, Spring. 3(3-0) May re-enroll for a maximum of 9 credits. Not applicable to major requirements.

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.

**410. Perspectives in American Studies**

Fall. 3 credits. Juniors in American Studies or approval of American Studies Committee.

Methods and significant works, for majors in the American Studies program. Offered by members of the relevant departments.

**411. Problems in American Civilization**

Winter, Spring. 3 credits. Majors must re-enroll for a maximum of 6 credits. 410, Juniors in American Studies or approval of American Studies Committee.

Seminar approach to selected problems in American life employing the objectives and approaches of interdisciplinary studies. Offered by members of relevant departments, for majors in the American Studies program.

**AMERICAN THOUGHT AND LANGUAGE ATL**

**University College**

Students may earn credit in only one of the courses in each of the following three groups:  
1. 121, 131, 141, 151, 161, 171, 181, 191H  
2. 122, 132, 142, 152, 162, 172, 182, 192H  
3. 123, 133, 143, 153, 163, 173, 183, 193H

**101A. Comprehensive English**

(1 S 095; 100.) Fall, Winter, Spring, Summer. 3(3-1) No student may receive credit in both 101A and 101B. Admission by examination or approval of department.

Instruction and practice in reading and writing. Emphasis upon mastery of fundamental skills needed for a variety of reading and writing assignments.

**101B. Comprehensive English**

(1 S 095; 100.) Fall, Winter, Spring, Summer. 3(3-1) No student may earn credit in both 101A and 101B. Admission by examination or approval of department.

Instruction and practice in reading and writing. Instruction in reading is emphasized.

**102. Comprehensive English**

Fall, Winter, Spring, Summer. 3(3-1) 101A or 101B.

Continuation of 101 with emphasis on writing and reading.

**103. Comprehensive English**

Fall, Winter, Spring, Summer 3(3-1)

Continuation of 102 with emphasis on reading and writing on American cultural topics.

**117. Use of Libraries**

Fall, Winter. 1(1-0)

The use of libraries, with emphasis on M.S.U. Library. Course will stress knowledge and use of bibliographic and reference resources.

**121. American Expression**

(111A.) Fall, Winter, Spring, Summer. 3(3-0) Satisfactory grade on English proficiency examination or in Comprehensive English.

Aims to improve the student's ability to read and write and to acquaint him with his American heritage. Selected reading and theme topics.

**122. American Expression**

(112A.) Fall, Winter, Spring, Summer. 3(3-0) Three credits in the first term of any ATL sequence numbered 121 or above; or satisfactory performance in Comprehensive English.

Aims to improve the student's ability to read and write, and to acquaint him with his American heritage. Selected reading and theme topics.

**123. American Expression**

(113A.) Fall, Winter, Spring, Summer. 3(3-0) Three credits in the second term of any ATL sequence numbered 121 or above; or satisfactory performance in Comprehensive English.

Aims to improve the student's ability to read and write, and to acquaint him with his American heritage. Selected reading and theme topics.

**131. Major Documents in American Experience**

(111B.) Fall, Winter, Spring, Summer. 3(3-0) Satisfactory grade on English proficiency examination or in Comprehensive English.

Aims to acquaint the student with significant works, and to improve his abilities at reading and writing. Selected readings and theme topics.

**132. Major Documents in American Experience**

(112B.) Fall, Winter, Spring, Summer. 3(3-0) Three credits in the first term of any ATL sequence numbered 121 or above; or satisfactory performance in Comprehensive English.

Aims to acquaint the student with significant works, and to improve his abilities at reading and writing. Selected readings and theme topics.

**133. Major Documents in American Experience**

(113B.) Fall, Winter, Spring, Summer. 3(3-0) Three credits in the second term of any ATL sequence numbered 121 or above; or satisfactory performance in Comprehensive English.

Aims to acquaint the student with significant works, and to improve his abilities at reading and writing. Selected readings and theme topics.

**141. American Humanities**

(111C.) Fall, Winter, Spring, Summer. 3(3-0) Satisfactory grade on English proficiency examination or in Comprehensive English.

Aims to acquaint the student with his American heritage with emphasis on artistic and literary expression; and to improve his ability to read and write.

**142. American Humanities**

(112C.) Fall, Winter, Spring, Summer. 3(3-0) Three credits in the first term of any ATL sequence numbered 121 or above; or satisfactory performance in Comprehensive English.

Aims to acquaint the student with his American heritage with emphasis on artistic and literary expression; and to improve his ability to read and write.