

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. 3(2-2)
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.

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.

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.

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.

475. International Studies in Agriculture and Natural Resources
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.

865. Rural Development Administration I
(802.) Winter. 3(2-2) *Approval of department. Interdepartmental with and administered by the Department of Agricultural Economics.*
Administrative concepts and their application in the analysis of the processes and structures through which agricultural and rural development activities are formulated and implemented in less developed countries.

866. Rural Development Administration II
(803.) Spring. 3(3-0) 865. *Interdepartmental with and administered by the Department of Agricultural Economics.*
Comparative analysis of major cases of intensive, purposeful change in less developed countries with emphasis on economic, administrative, political and other relevant factors which help explain program or policy effectiveness.

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

(I S 095; 100.) Fall, Winter, Spring, Summer. 3(4-0) 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

(I S 095; 100.) Fall, Winter, Spring, Summer. 3(4-0) 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(4-0) 101A or 101B. Continuation of 101 with emphasis on writing and reading.

103. Comprehensive English

Fall, Winter, Spring, Summer. 3(4-0) 102. 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.

143. American Humanities

(113C.) 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 his American heritage with emphasis on artistic and literary expression and to improve his ability to read and write.

151. American Minorities

(111D.) Fall. 3(3-0) Satisfactory grade on English proficiency examination or in Comprehensive English.

Aims to acquaint the student with the experience of minorities in America, and to improve his ability at reading and writing. Selected readings and theme topics.

152. American Minorities

(112D.) Winter. 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 the experience of minorities in America, and to improve his ability at reading and writing. Selected readings and theme topics.

153. American Minorities

(113D.) Spring. 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 the experience of minorities in America, and to improve his ability at reading and writing. Selected readings and theme topics.

161. American Radical Thought

(111E.) Fall. 3(3-0) Satisfactory grade on English proficiency examination or in Comprehensive English.

Aims to acquaint the student with ideas concerning radical social change, and to improve his ability at reading and writing. Selected readings and theme topics.

162. American Radical Thought

(112E.) Winter. 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 ideas concerning radical social change, and to improve his ability at reading and writing. Selected readings and theme topics.

163. American Radical Thought

(113E.) Spring. 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 ideas concerning radical social change, and to improve his ability at reading and writing. Selected readings and theme topics.

171. America on Film

(111F.) Fall. 3(3-0) Satisfactory grade on English proficiency examination or in Comprehensive English.

Aims to acquaint the student with cinematic and fictional representation of experience, and to improve his ability at reading and writing. Selected readings and theme topics.

172. America on Film

(112F.) Winter. 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 cinematic and fictional representation of experience, and to improve his ability at reading and writing. Selected readings and theme topics.

173. America on Film

(113F.) Spring. 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 cinematic and fictional representation of experience, and to improve his ability at reading and writing. Selected readings and theme topics.