

**Agricultural Engineering—Descriptions
of
Courses**

802. Computational Methods in Food and Agricultural Engineering
Fall of odd-numbered years. 3(3-0)
P: MSM 809. R: Open only to graduate students in College of Engineering.
Formulation and solution of mathematical equations in food and agricultural engineering. Constitutive equations. Linear and nonlinear problems. Steady state and transient problems. Computer solutions.

812. Bio-Processing Engineering
Spring of even-numbered years. 3(3-0)
R: Open only to graduate students in College of Engineering.
Thermodynamics, heat and mass transfer, fluid flow, dehydration. Handling and storage of biological products.
QA: AE 812

815. Instrumentation for Food and Agricultural Engineering
Fall. 3(3-0)
R: Open only to graduate students in College of Engineering.
Theory and techniques of measuring temperature, pressure, flow, humidity, and moisture in biological materials.
QA: AE 815

820. Research Methods in Agricultural Engineering
Fall. 1(1-0)
R: Open only to graduate students in College of Agriculture and Natural Resources or College of Engineering.
Procedures and methods for designing and executing research projects.
QA: AE 820

850. Dimensional Analysis and Similitude Modelling
Fall. 3(2-2)
R: Open only to graduate students in College of Agriculture and Natural Resources or College of Engineering.
Dimensional concepts, systems of measurements and transformation of units, and formation of dimensionless groups. Development of prediction equations, concepts of similarity, and scaling laws. Distortion.
QA: AE 850

882. Irrigation and Water Management Engineering
Spring of odd-numbered years. 3(3-0)
P: AE 481, CE 321.
Design and management of systems for supplemental irrigation. Water supply and transport. Economic and engineering optimization of irrigation design.
QP: AE 481, CE 321 QA: AE 482

890. Special Problems
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course.
R: Approval of department; application required.
Individual study in agricultural engineering.
QA: AE 880

891. Advanced Topics in Agricultural Engineering
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course.
R: Open only to graduate students in College of Engineering. Approval of department.
Agricultural engineering topics not covered in regular courses.
QA: AE 890

892. Agricultural Engineering Seminar
Spring. 1(1-0)
R: Open only to graduate students in College of Agriculture and Natural Resources or College of Engineering.
Current topics in agricultural engineering.
QA: AE 822

899. Master's Thesis Research
Fall, Spring, Summer. 1 to 10 credits. A student may earn a maximum of 10 credits in all enrollments for this course.
R: Open only to graduate students in Agricultural Engineering. Approval of department.
QA: AE 899

999. Doctoral Dissertation Research
Fall, Spring, Summer. 1 to 24 credits. A student may earn a maximum of 36 credits in all enrollments for this course.
R: Open only to graduate students in Agricultural Engineering. Approval of department.
QA: AE 999

**AGRICULTURAL
TECHNOLOGY AND SYSTEMS
MANAGEMENT ATM**

**Department of Agricultural
Engineering
College of Agriculture and Natural
Resources
College of Engineering**

315. Occupational and Personal Safety
Spring. 2(2-0)
P: CSS 101 or ANS 110 or AEE 101 or HRT 201. R: Open only to College of Agriculture and Natural Resources majors.
Principles of safety problem solving. Accident causation and prevention. Laws and regulations. Machinery, electrical, chemical and fire safety. Security. Safety program development.
QA: ATM 415

326. Principles of Animal Environments
Spring. 2(2-0)
P: MTH 116 or MTH 120; CPS 100 or CPS 130 or CPS 131. R: Open only to College of Agriculture and Natural Resources majors.
Heat and moisture balances for confined livestock. Interior environment and its control. Waste management.
QP: MTH 110, CPS 100 QA: ATM 426

431. Irrigation, Drainage and Erosion Control Systems
Fall. 3(2-2)
P: MTH 116 or MTH 120; CSS 210. R: Not open to freshmen and sophomores.
Principles of soil and water conservation engineering including: land and soil surveying, basic hydraulics, hydrology, soil moisture, and soil and water conservation practices with applications to irrigation, drainage and erosion control systems.
QP: MTH 111, CSS 210 QA: ATM 231, ATM 431

440. Agricultural Machinery Systems
Fall. 3(3-0)
P: CSS 210; MTH 110 or MTH 116; CPS 100 or CPS 130 or CPS 131. R: Open only to majors in College of Agriculture and Natural Resources.
Principles, analysis, management, and economics of agricultural machinery systems. Consideration of weather conditions, cultural practices, crop rotation, labor, and energy.
QP: MTH 108, MTH 111, CPS 100, CPS 112, CPS 115, CSS 210 QA: ATM 440

490. Independent Study
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 8 credits in all enrollments for this course.
P: ATM 231 or ATM 240 or BCM 311. R: Open only to majors in Agricultural Technology and Systems Management. Approval of department; application required.
Supervised individual student research and study in agricultural technology and systems management.
QP: ATM 231, ATM 240, ATM 311 QA: ATM 480

491. Special Topics in Agricultural Technology and Systems Management
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 8 credits in all enrollments for this course.
P: ATM 231 or ATM 240 or BCM 311. R: Open only to majors in Agricultural Technology and Systems Management.
Special topics in agricultural technology and systems management.
QP: ATM 231, ATM 240, ATM 311 QA: ATM 490

804. Agricultural Mechanization in Developing Countries
Fall of odd-numbered years. 3(3-0)
R: Open only to graduate students in College of Agriculture and Natural Resources or College of Engineering.
Human, animal and mechanical power for smaller farms. Machine selection, local manufacturing, ownership patterns.
QA: ATM 804

807. Human Factors Engineering
Fall of even-numbered years. 3(3-0)
R: Open only to graduate students in College of Agriculture and Natural Resources or College of Engineering.
Ergonomics. Analysis of machine designs, operation, and working environment in relation to human limitations and capabilities. Procedures to develop maximum human-machine compatibility and performance.
QA: ATM 807

831. Water, Technology and International Development
Spring of odd-numbered years. 3(3-0)
P: AE 481 or ANR 489 or ATM 431 or CSS 210. R: Open only to graduate students in College of Agriculture and Natural Resources or College of Engineering.
Water resources planning and development for irrigated agriculture. Technological, agronomic, environmental, social and political constraints. Case studies.
QP: CSS 210, ATM 431, AE 481, ANR 399 QA: ATM 890

836. Microclimate and Its Measurement
Spring. 4(3-3) Interdepartmental with Geography.
The climate near the Earth's surface. Energy balance, thermal radiation exchange, heat fluxes, temperature sensors, wind speed and direction, humidity and evapotranspiration and their measurement.
QA: ATM 436, ATM 808

840. Analysis of Physical Systems
Fall. 3(3-0)
P: ATM 440 or BCM 311 or MGT 306. R: Open only to graduate students in College of Agriculture and Natural Resources.
Identification and definition of systems problems in agricultural and construction industries. Model formulation and estimation.
QP: ATM 440, ATM 311, MGT 306 QA: ATM 806

845. Process Network Theory Applied to Agroecosystems
Spring of even-numbered years. 4(4-0)
R: Open only to graduate students in College of Agriculture and Natural Resources or College of Engineering.
Numerical framework for the technical, economic and environmental analysis of agricultural and biological systems.
QA: ATM 890

890. Special Problems
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 4 credits in all enrollments for this course.
R: Approval of department.
Individual study of selected topics.
QA: ATM 880

891. Advanced Topics in Agricultural Technology and Systems Management
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 8 credits in all enrollments for this course.
R: Open only to graduate students in College of Agriculture and Natural Resources or College of Engineering.
New developments in agricultural technology and systems management.
QA: ATM 890

899. Master's Thesis Research
Fall, Spring, Summer. 1 to 10 credits. A student may earn a maximum of 99 credits in all enrollments for this course.
R: Open only to graduate students in Agricultural Technology and Systems Management. Approval of department.
QA: ATM 899

999. Doctoral Dissertation Research
Fall, Spring, Summer. 1 to 24 credits. A student may earn a maximum of 99 credits in all enrollments for this course.
R: Open only to Ph.D. students in Agricultural Technology and Systems Management. Approval of department.
QA: ATM 999

AGRICULTURE AND NATURAL RESOURCES ANR

College of Agriculture and Natural Resources

350. Leadership Development for Agriculture and Natural Resources
Spring. 2(2-0)
R: Not open to freshmen and sophomores. Approval of college; application required.
Preparation for community leadership. Field observation of social, economic and political problems. Emphasis on awareness, action and involvement. Seminars and interviews.
QA: ANR 350

392. Agriculture and Natural Resources Seminar
Spring. 1(2-0)
R: Not open to freshmen and sophomores.
Current agricultural, natural resources and environmental problems and solutions. Discussion leaders from various disciplines.
QA: ANR 425

475. International Studies in Agriculture and Natural Resources
Fall, Spring, Summer. Given at various off campus sites. 2 to 6 credits. A student may earn a maximum of 6 credits in all enrollments for this course.
R: Approval of college; application required.
Study-travel experience emphasizing contemporary problems affecting agriculture and natural resources in the world, national and local communities. Case studies and interviews with officials, community leaders and leading professionals.
QA: ANR 475

481. Agricultural Research Systems in Developing Countries
Summer. 2(2-0) Interdepartmental with Agricultural Economics, Animal Science, and Crop and Soil Sciences.
R: Open only to seniors and graduate students in the College of Agriculture and Natural Resources.
Planning, organizing and managing agricultural research systems. Problems and alternative reforms to improve research productivity. Adapting new agricultural technology in developing countries.
QA: ANR 480

489. Integrated Approaches to Agriculture and Natural Resources Problems
Fall, Spring. 3(2-2)
P: MTH 110 or MTH 116; EC 201 or EC 202. R: Open only to seniors in the College of Agriculture and Natural Resources.
Holistic solutions to resource management and allocation: an integrated, multidisciplinary team approach to case study problems.
QP: MTH 109, MTH 110, MTH 111, EC 201, EC 202

491. Selected Topics
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 6 credits in all enrollments for this course.
R: Not open to freshmen and sophomores.
Special topics in agriculture and natural resources.
QA: ANR 480

493. Professional Internship in Agriculture and Natural Resources
Fall, Spring, Summer. 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course.
R: Open only to juniors and seniors in the College of Agriculture and Natural Resources. Approval of department; application required.
Supervised professional experiences in agencies and businesses related to a student's major field of study.
QA: ANR 399

AMERICAN STUDIES AMS

College of Arts and Letters

491. Perspectives in American Studies
Fall. 3(3-0) A student may earn a maximum of 6 credits in all enrollments for this course.
R: Not open to freshmen and sophomores.
Methods and significant works in American Studies. Topics vary.
QA: AMS 410

492. Seminar in American Studies
Spring. 3(3-0) A student may earn a maximum of 6 credits in all enrollments for this course.
R: Open only to majors in Arts and Letters, James Madison College, and Lyman Briggs School.
Selected topics in American life emphasizing interdisciplinary approaches. Topics vary.
QA: AMS 411

881. American Studies Theory, Methods, and Bibliography
Fall. 3(3-0)
Methods and bibliographical sources of American Studies research. Interdisciplinary approaches to studying American culture.
QA: A L 801

890. Independent Study
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 12 credits in all enrollments for this course.
R: Approval of college.
Special projects, directed reading, and research arranged by an individual graduate student and a faculty member in areas supplementing regular course offerings.
QA: A L 803

891. Special Topics in American Studies
Fall, Spring, Summer. 4(4-0) A student may earn a maximum of 12 credits in all enrollments for this course.
R: Approval of college.
Special topics supplementing regular course offerings proposed by faculty for graduate students on a group study basis.
QA: A L 802

899. Master's Thesis Research
Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 6 credits in all enrollments for this course.
R: Approval of college.
Directed research leading to a master's thesis in partial fulfillment of Plan A master's degree requirements.

AMERICAN THOUGHT AND LANGUAGE ATL

Department of American Thought and Language College of Arts and Letters

0102. Preparation for College Writing
Fall, Spring. 0(0-2)/1(1-2) See page A-2, item 3.]
C: ATL 1004 R: Designated score on English placement test.
Practice in applying the principles of English grammar, syntax, and word usage to writing.
QA: ATL 0991

1004. Preparation for College Writing
Fall, Spring. 3(3-0)
C: ATL 0102 R: Designated score on English placement test.
Composing, revising, and editing. Active reading and pre-writing strategies. Style, mechanics, and usage. Organization and proofreading.
QA: ATL 1144, ATL 1154

101. Library Resources
Fall, Spring, Summer. 1(1-0)
Use of libraries for researching college assignments and papers. Emphasis on bibliographic and reference tools.
QA: ATL 117

110. Writing: Science and Technology
Fall, Spring. 4(4-0)
P: Designated score on English placement test or ATL 1004. R: Not open to students with credit in MC 111, MC 112, LBS 133, ATL 120, ATL 125, ATL 130, ATL 140, ATL 145, ATL 150, ATL 195H.
Drafting, revising, and editing compositions derived from readings on American science and technology to develop skills in narration, persuasion, analysis, and documentation.
QA: ATL 1154, ATL 1164, ATL XY2, ATL XY3

120. Writing: American Philosophy, Literature, and the Arts
Fall, Spring. 4(4-0)
P: Designated score on English placement test or ATL 1004. R: Not open to students with credit in MC 111, MC 112, LBS 133, ATL 110, ATL 120, ATL 130, ATL 140, ATL 145, ATL 150, ATL 195H.
Drafting, revising, and editing compositions derived from readings on American philosophy, literature, and the arts to develop skills in narration, persuasion, analysis, and documentation.
QA: ATL 1154, ATL 1164, ATL XY2, ATL XY3

125. Writing: The American Ethnic and Racial Experience
Fall, Spring. 4(4-0)
P: Designated score on English placement test or ATL 1004. R: Not open to students with credit in MC 111, MC 112, LBS 133, ATL 110, ATL 120, ATL 130, ATL 140, ATL 145, ATL 150, ATL 195H.
Drafting, revising, and editing compositions derived from readings on the experience of American ethnic and racial groups to develop skills in narration, persuasion, analysis, and documentation.
QA: ATL 1154, ATL 1164, ATL XY2, ATL XY3

130. Writing: American Radical Thought
Fall, Spring. 4(4-0)
P: Designated score on English placement test or ATL 1004. R: Not open to students with credit in MC 111, MC 112, LBS 133, ATL 110, ATL 120, ATL 125, ATL 140, ATL 145, ATL 150, ATL 195H.
Drafting, revising, and editing compositions derived from readings on American radical thought to develop skills in narration, persuasions, analysis, and documentation.
QA: ATL 1154, ATL 1164, ATL XY2, ATL XY3

140. Writing: Women in America
Fall, Spring. 4(4-0)
P: Designated score on English placement test or ATL 1004. R: Not open to students with credit in MC 111, MC 112, LBS 133, ATL 110, ATL 120, ATL 125, ATL 130, ATL 145, ATL 150, ATL 195H.
Drafting, revising, and editing compositions derived from readings on women in America to develop skills in narration, persuasion, analysis, and documentation.
QA: ATL 1154, ATL 1164, ATL XY2, ATL XY3