

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 and Extension Education.

AGRICULTURAL ECONOMICS

AEC

Department of Agricultural Economics College of Agriculture and Natural Resources

481. Agricultural Research Systems in Developing Countries
Summer. 2(2-0) Interdepartmental with Agriculture and Natural Resources, Animal Science, and Crop and Soil Sciences. Administered by Agriculture and Natural Resources.
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.

800. Foundations of Agricultural Economics
Fall. 3(3-0)
Concepts of agricultural economics drawn from economic and management theory. Applications to economic decisions and policy issues related to agricultural, food, and natural resource firms, markets, and institutions.

800A. Mathematical Applications in Agricultural Economics
Fall. 1(1-0)
C: AEC 800 concurrently.
Basic mathematical tools for use in agricultural economics applications.

810. Institutional and Behavioral Economics
Fall. 3(3-0) Interdepartmental with Economics and Resource Development.
Relationships among institutions, individual and collective actions, and economic performance. Public choice, property rights, and behavioral theories of firms and bureaucracies.

815. Applied Welfare Economics in Agriculture
Fall of odd-numbered years. 3(3-0)
P: EC 801; EC 805 or EC 812A; EC 809 or EC 813A.
Concepts and issues in welfare economics with application to agricultural development, policy and trade, marketing and finance, and environmental policy.

817. Political Economy of Agricultural and Trade Policy
Spring. 3(3-0)
P: EC 805 or EC 812A; EC 809 or EC 813A.
Concepts of policy analysis and decision. Agricultural sector problems, behavior, and policy in the development process. Macroeconomic and trade impacts. International policies affecting trade and development. Current policy issues.

820. Econometrics I
Spring. 3(3-0) Interdepartmental with Economics and Statistics and Probability. Administered by Economics.
P: EC 801, STT 430.
The single equation regression model. Properties of least-squares estimators under various specifications. Multicollinearity, generalized least-squares, errors in variables, seemingly unrelated regressions. Identification and estimation in simultaneous equations models.

821. Econometrics II
Fall. 3(3-0) Interdepartmental with Economics and Statistics and Probability. Administered by Economics.
P: EC 820, STT 442.
Estimation and hypothesis testing. Asymptotic properties of optimization estimators. Analysis of cross-sectional economic data. Qualitative and limited dependent variables. Probit, logit, tobit, and sample selectivity. Duration models. Count data.

822. Econometrics III
Spring. 3(3-0) Interdepartmental with Economics and Statistics and Probability. Administered by Economics.
P: EC 820, STT 442.
Dynamic models and time series data. ARMA models. ARCH models. Unit roots, cointegration and error correction. Rational expectations models.

829. The Economics of Environmental Resources
Fall. 3(3-0) Interdepartmental with Resource Development; Forestry; Park, Tourism and Recreation Resources; and Economics.
Economic principles related to environmental conflicts and public policy alternatives. Applications to water quality, land use, conservation, development, and global environmental issues.

831. Food Marketing Management
Spring. 3(3-0) Interdepartmental with Marketing and Supply Chain Management. Administered by Marketing and Supply Chain Management.
P: MBA 820 or MSC 805.
Marketing management decisions in food firms. Consumer orientation, computer technologies, food system cost reduction, global opportunities, environmental and social issues.
SA: ML 831

832. Environmental and Natural Resource Law
Fall. 3(3-0) Interdepartmental with Resource Development, Forestry, Crop and Soil Sciences, and Geography. Administered by Resource Development.
P: RD 430.
Origin and development of environmental law. Theories of power, jurisdiction, sovereignty, property interests, pollution, and other bases for legal controls of natural resources. Common law and constitutional limitations on governmental power.

835. Introductory Econometrics
Summer. 3(3-0)
P: STT 430.
Estimation and interpretation of multiple regression models and their modifications when usual assumptions are not valid. Applications focus on problems faced by agricultural economists.

837. Water Law
Spring. 3(3-0) Interdepartmental with Resource Development and Forestry. Administered by Resource Development.
P: RD 430.
Legal principles applicable to surface water and groundwater, private and public water rights, and controls over water resources. Cases, statutes, and administrative procedures.

838. Land Use Law
Spring. 3(3-0) Interdepartmental with Resource Development, Forestry, and Urban Planning. Administered by Resource Development.
P: RD 430.
Public and private land use controls in the U.S. Civil rights, housing, energy problems, growth management, waste management, and land conservation. Cases, statutes and other regulations.

841. Organization and Performance of Agricultural Markets
Spring. 3(3-0)
R: Open only to graduate students in College of Agriculture and Natural Resources.
Analytical approaches. Institutions and processes for coordinating food and agricultural systems. Issues of organization, control and public policy.

845. Commodity Market Analysis
Fall. 3(3-0)
P: AEC 835.
Applied econometric analysis of commodity markets. Emphasis on specification and estimation of demand and supply models for forecasting. Modeling for policy evaluation. Futures and options markets. Microcomputer applications.

851. Agricultural Firm Management
Summer. 3(3-0)
Managerial processes for planning and controlling agricultural firms. Applications of financial concepts, budgets, simulations, and cognitive and information systems to developed and developing countries. Predictive and prescriptive analysis.

855. Agricultural Production Economics
Spring. 3(3-0)
P: EC 801, EC 805.
Agricultural applications of static production economics, including study of capital inputs that yield services over several time periods. Investment and disinvestment models. Methods for incorporating risk and technological change.

861. Agriculture in Economic Development
Fall. 3(3-0)
Role of agriculture in economic development of low- and middle-income countries. Theories of agricultural growth. Policy issues. Case studies.

865. Agricultural Benefit-Cost Analysis
Spring. 3(3-0)
Benefit-cost analysis of agricultural and natural resource projects, including financial and economic analysis. Case studies in project design and appraisal in low and high income countries.

890. Independent Study
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 8 credits in all enrollments for this course.
R: Open only to graduate students in Agricultural Economics. Approval of department.
Independent study of selected topics in agricultural economics.

891. Topics in Agricultural Economics (MTC)
Fall, Spring, Summer. 2 to 3 credits. A student may earn a maximum of 12 credits in all enrollments for this course.
R: Open only to graduate students in colleges of Agriculture and Natural Resources, Social Science and Business.
Selected topics such as agribusiness management, applied operations research, or rural development policy.

898. Master's Research
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 4 credits in all enrollments for this course.
R: Open only to graduate students in Agricultural Economics. Approval of department.
Master's degree Plan B research.

Descriptions — Agricultural Economics of Courses

899. Master's Thesis Research
Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 99 credits in all enrollments for this course.
R: Open only to graduate students in Agricultural Economics. Approval of department.

923. Theory of Resource and Environmental Economics
Spring of even-numbered years. 3(3-0) Interdepartmental with Resource Development; Forestry; Park, Recreation and Tourism Resources; and Economics.
P: AEC 829, EC 805.
 Economic theory of environmental change and control. Market and non-market allocation mechanisms. Temporal issues of conservation and growth. Contemporary issues in research and policy.

947. Analysis of Food Systems Organization
Summer. 3(3-0)
P: AEC 810, AEC 841, AEC 845.
 Public and private policy issues related to the organization and performance of food systems.

991. Advanced Topics in Agricultural Economics (MTC)
Fall, Spring, Summer. 2 credits. A student may earn a maximum of 12 credits in all enrollments for this course.
R: Open only to Ph.D. students in the colleges of Agriculture and Natural Resources, Business, and Social Science.
 Topics such as international agricultural development, environmental economics, and trade policy.

992. Seminar in Agricultural Economics
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 3 credits in all enrollments for this course.
R: Open only to Ph.D. students in Agricultural Economics. Approval of department; application required.
 Price analysis, development, risk, trade, dynamic modeling research methods, finance and environmental economics.

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 Economics. Approval of department.

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.

326. Principles of Animal Environments
Spring. 2(2-0)
P: MTH 116 or MTH 120; CPS 101 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.

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.

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.

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.

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.

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.

831. Water, Technology and International Development
Spring of even-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.

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.

845. Process Network Theory Applied to Agroecosystems
Spring of odd-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.

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.

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.

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.

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.

AGRICULTURE AND NATURAL RESOURCES ANR

College of Agriculture and Natural Resources

101. Preview of Science
Fall. 1(1-0) Interdepartmental with Natural Science, Engineering, and Social Science. Administered by Natural Science.
R: Approval of college.
 Overview of natural sciences. Transitional problems. Communications and computer skills. Problem solving skills. Diversity and ethics problems in science and society.

192. Environmental Issues Seminar
Fall, Spring. 1(1-0) A student may earn a maximum of 4 credits in all enrollments for this course.
Interdepartmental with Natural Science, Engineering, and Social Science. Administered by Natural Science.
R: Open only to students in the College of Agriculture and Natural Resources, College of Engineering, College of Natural Science, and College of Social Science. Approval of college.
 Environmental issues and problems explored from a variety of perspectives, including legal, scientific, historical, political, socio-economic, and technical points of view.

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.

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.