

**441. Television and Radio Advertising**  
*Fall, Winter, Spring. 4(4-0) 205.*

Principles and practices underlying successful radio-television advertising; emphasis on media research, rate structure, programming, creativity; instruction in televising commercials.

**449. Advertising Agency Workshop**  
*Winter, Spring. 3(2-2) 317; MTA 300.*

Advertising procedure including application of research, copy, layout, media selection, and merchandising to specific problems. Study of the advertising agency. Student groups work out campaigns for area manufacturers or agencies and present to company executives.

**460. Advertising Management**  
*Fall, Winter, Spring, Summer. 4(2-2) 205, MTA 300 or approval of department.*

Decision theory and techniques used in planning, directing, and evaluating advertising. Emphasis on media-message strategies and media systems. Use of cases in small groups.

**470. International Advertising**  
*Winter. 4(4-0) 205, 460; MTA 300; or approval of department.*

International advertising and promotion; formulation and implementation of international promotional strategies and policies; cases and problems from the viewpoint of advertisers and advertising agencies.

**475. Advertising Research**  
*Fall, Winter, Spring. 4(3-2) 205.*

Nature, scope, and applications of research in advertising; theory, concept, and fact in the research process; dimensions of advertising research: data collection, field investigation, measurements of advertising and media audiences; evaluation of advertising messages.

**499. Individual Projects**  
*Fall, Winter, Spring, Summer. Variable credit. Approval of department.*

**805. Advertising Management**  
*(820A.) Fall, Winter. 4(4-0)*

Planning and formulating promotional strategy; establishing policies and making decisions to solve promotional problems of advertisers and agencies. Emphasis on case analysis.

**810. Advertising Media Strategy**  
*(820B.) Spring. 4(4-0)*

Current problems in media selection. Efficient methods of planning media strategy. Evaluation of mass of media information available.

**815. Advertising and Society**  
*(820C.) Winter, Spring. 3(3-0) May re-enroll for a maximum of 6 credits.*

Investigation of theory and scientific evidence relevant to the process and effect of advertising on individuals and on the socio-economic system. Critical examination of the social responsibilities of advertising.

**832. Problems in Public Relations**  
*Spring. 4(4-0) 427 or approval of department.*

Public relations practice in the U.S. and abroad. Study of recent cases in public relations of corporations, associations, education, government and welfare organizations.

**890. Special Problems**  
*Fall, Winter, Spring, Summer. Variable credit. Approval of department.*

**899. Research**  
*Fall, Winter, Spring. Variable credit. Approval of department.*

**AEROSPACE STUDIES A S**

**All University**

**110. First-Year Basic**  
*Fall. 1(1-1)*

Exploration of the causes of present world conflict as they affect the security of the United States. Survey of theory and practice of democracy and communism. Basic leadership orientation.

**111. First-Year Basic**  
*Winter. 1(1-1) 110.*

Analysis of the United States power position in world affairs including a study of our national defense structure. Basic concepts of discipline and leadership.

**112. First-Year Basic**  
*Spring. 1(1-1) 111.*

Comparison of the missions and functions of specific Air Force commands including employment of contemporary aerospace equipment and systems. Introduction to the professional opportunities in the USAF. Application of leadership concepts on the parade field.

**210. Second-Year Basic**  
*Fall. 1(1-1) 112.*

Comparative study of free world land, naval and air forces and changing concepts of force employment. Continuation of leadership development.

**211. Second-Year Basic**  
*Winter. 1(1-1) 210.*

Study of the mission, organization, functions and characteristics of communist military systems and security organizations. Continuation of leadership development.

**212. Second-Year Basic**  
*Spring. 1(1-1) 211.*

Exploration of future trends in development and employment of military power including astronomical operations, and their impact on world affairs. Integration of leadership concepts on the parade field.

**310. First-Year Advanced**  
*Fall. 3 credits. 212.*

Development of requisite communication skills. Survey of the nature of military conflict, the development of aerospace power and doctrine governing its employment. Leadership experience at lower command echelons.

**311. First-Year Advanced**  
*Winter. 3 credits. 310.*

Development of instructional methods and techniques. Examination of Air Force organization and mission as the aerospace power and its employment in limited and general military actions. Continuation of Air Force officer development.

**312. First-Year Advanced**  
*Spring. 3 credits. 311.*

Study of national space effort. Survey of solar system as it affects space exploration and operations. Study of the mechanics of space vehicle systems including orbits and trajectories. Survey of the principles and problems of current and planned space operations. Assumption of cadet staff and command positions. Preparation for summer training.

**410. Second-Year Advanced**  
*Fall. 3 credits. 312.*

Study of military professionalism—its meaning, foundations and responsibilities. Practical use of leadership, management and communicative skills in cadet direction and control.

**411. Second-Year Advanced**  
*Winter. 3 credits. 410.*

Study of leadership theory, functions and practices. Study of management principles and functions. Practical experience in the duties of the professional officer.

**412. Second-Year Advanced**  
*Spring. 3 credits. 411.*

Study of the Military Justice System. Practice in the proper use of management tools and in Air Force decision-making and problem-solving methods. Final preparation for assumption of the professional duties of an Air Force officer.

**AFRICAN LANGUAGES**

See Linguistics and Oriental and African Languages

**AGRICULTURAL ECONOMICS AEC**

**College of Agriculture and Natural Resources**

**240. Agriculture in the Economy**  
*Winter. 5(4-1)*

Economic and management principles in agriculture. Demand for farm products, principles of marketing and price determination. Identification of individual and societal problems related to agriculture. Alternative approaches to their solution.

**401. Production Economics and Management**  
*Fall, Summer of even-numbered years. 4(4-0) 240 or EC 201. Interdepartmental with the Resource Development Department.*

Economic principles of production. Industry supply and factor demand analysis. Management concepts and choice criteria. Interrelationships of production and consumption decisions. Examples drawn from agriculture.

**412. Farm Finance and Appraisal**  
*Spring. 3(3-0) 240 or EC 201.*

Agricultural capital: sources and requirements. Sources and terms of agricultural credit. Credit instruments. Interest rates. Agricultural credit policy issues. Principles of farm financial management and farm real estate appraisal.

**417. Land Economics**  
*Fall, Spring. 240 or EC 201 or approval of department. Interdepartmental with the Resource Development and Economics Departments and administered by the Resource Development Department.*

Factors affecting man's economic use of land and space resources. Input-output relationships; development, investment, and enterprise location decisions. Land markets; property rights; area planning; zoning and land use controls.

**420. Agricultural Business Management**  
*Spring. 3(3-0) Seniors majoring in Agricultural Business or approval of department.*

Application of management principles to problems confronting agricultural businesses. The case method is used in considering problems of finance, procurement, product development, processing methods, pricing, selling, and distribution.

**441. Agricultural Prices and Marketing**  
*Winter. Summer of odd-numbered years. 4(4-0) 240 or EC 201.*  
 Price determination and forces effecting change. Organization of commodity and farm supply markets. Role of government in marketing. Framework for analyzing marketing problems.

**443. Group Action in Commodity Markets**  
*Spring. 3(3-0) 240 or EC 201.*

Cooperatives in farm products and input markets. Bargaining, market orders and agreements, vertical and horizontal coordination. Directed study of specialized commodity marketing problems selected by student.

**451. Farm Management**  
*Fall. 5(3-2) 240 or EC 201.*

Farm business planning for efficient use of resources and attainment of business and family goals, principles of economics, management, farm accounting, insurance, property and contracts, and related fields as they apply to short-range and long-range planning.

**460. United States Agricultural Policy**  
*Spring. 3(3-0) 240 or EC 201 or approval of department.*

Concept of policy, how made, objectives. Alternative methods of solving farm problems and analysis of consequences for farmer, consumer, and taxpayer.

**462. World Agriculture and Economic Development**

*Fall. Summer of even-numbered years. 3(3-0) 240 or EC 201. Interdepartmental with Agriculture.*

Food and agricultural problems of the world. Role of agriculture in the process of economic development. Relationships of agricultural trade patterns, farming systems and economic growth.

**470. Analysis and Presentation of Agricultural Data**

*Winter. 3(3-0) 240 or EC 201; one course in statistics.*

Sources, collection, reliability and presentation of data. Appraisal and use of economic indicators. Elementary methods of price analysis including trends and seasons. Interpretation of statistical inferences regarding agricultural data.

**482. Independent Study**

*Fall, Winter, Spring, Summer. Variable credit. May re-enroll for a maximum of 6 credits. Approval of department.*

Readings, approved off-campus projects, special problems including senior research papers for majors.

**803. Emergence, Concepts and Setting of Agricultural Economics**

*Fall. 1 to 3 credits.*

Historical and institutional development of agricultural economics. Central concepts and interrelations of sub-fields. Politico-economic setting of agriculture and the role of agricultural economists.

**805. Agricultural Production Economics**

*Winter. 3(3-0) 401 or approval of department.*

Resource allocation and efficiency. Production and efficiency in the firm, between firms, and between agriculture and other industries. Agricultural economics applications.

**810. Advanced Land Economics**

*Winter. 3(3-0) RD 417 or approval of department. Interdepartmental with and administered by the Resource Development Department.*

Analysis of economic concepts involving land resources. Costs, returns, rent and valuation theory. Applications of rent theory to successful enterprise location, development, use and conservation of land resources.

**811. Public Program Analysis**

*Spring of even-numbered years; Summer of odd-numbered years. 3(3-0) 401 or EC 324 or approval of department. Interdepartmental with the Resource Development Department.*

Application of benefit-cost analysis to public programs of resources development. Issues and case studies in budgeting, investment criteria, pricing, externalities, and coordination.

**833. Mathematical Programming**

*(875). Spring. 3(3-0) EC 800 or 811, MTH 334. Interdepartmental with the Economics, and Statistics and Probability Departments.*

Linear programming. Theory of linear economic models. Topics in nonlinear programming.

**835. Econometrics and Price Analysis**

*(831). Fall, Spring, Summer. 3(3-0) EC 325, STT 422. Interdepartmental with and administered by the Economics Department.*

Specification, estimation and interpretation of economic models. Applications to empirical problems.

**841. Advanced Agricultural Marketing**

*Fall. 3(3-0) 441 or approval of department.*

Market organization and evaluation of performance. Pricing and market coordination problems. Group action in agricultural markets. Role of marketing in economic development.

**849. Consumption Analysis**

*Spring. 3(3-0) Approval of department.*

Analysis of factors influencing individual and group consumption patterns. Application of behavioral science concepts and findings to understanding consumer choice and economic policy issues related to consumption.

**851. Advanced Farm Management**

*Winter. Summer of odd-numbered years. 3(2-2) 451 or approval of department.*

Emphasizes identification, analysis, and methods of solving problems of farm organization and operation; new technology, specialization and scale. Farm case studies, role-playing, computer games and farm business simulation.

**861. Agricultural Trade Policies**

*Fall of odd-numbered years; Summer of even-numbered years. 3(3-0) EC 427 or approval of department.*

International trade in agricultural products, areas of competition, changes in comparative advantage, interrelationship of national and international policy, regional groupings, trade and economic development, current policy proposals.

**862. Agriculture in Economic Development**

*Winter. 3(3-0) 462 or approval of department.*

Agricultural and industrial sector interactions in the development process. Theories and models of the agricultural development process. Transformation of agriculture in less-developed countries.

**876. Statistical Inference in Economics I**

*Fall. 3(3-0) EC 812 or 801; STT 443 or 863; or approval of department. Interdepartmental with the Economics, and Statistics and Probability Departments and administered by the Economics Department.*

Review and extension of single-equation regression models. Properties of least-squares estimators under alternative specifications. Problems of analyzing non-experimental data. Errors in variables, autoregressive and heteroscedastic models.

**877. Statistical Inference in Economics II**

*Winter. 3(3-0) EC 876 or approval of department. Interdepartmental with the Economics, and Statistics and Probability Departments and administered by the Economics Department.*

Specification interpretation and estimation of simultaneous equation models. Nonlinear models. Bayesian approach to estimation problems. Recent developments in econometrics.

**878. Statistical Inference in Economics III**

*Spring. 3(3-0) EC 877 or approval of department. Interdepartmental with the Economics, and Statistics and Probability Departments and administered by the Economics Department.*

Validation and application of dynamic econometric models. Bayesian approach to estimation problems. Recent developments in econometric methods and in applied econometric research.

**879. Interdisciplinary Seminar: Behavioral and Historical Approaches to Problems of Selected Foreign Areas**

*For course description, see Interdisciplinary Courses.*

**882. Independent and Supervised Study**

*Fall, Winter, Spring, Summer. Variable credit. May re-enroll for a maximum of 6 credits. Approval of department.*

Arranged seminars initiated by faculty or students; supervised readings; individual study of special problems.

**899. Research**

*Fall, Winter, Spring, Summer. Variable credit. Approval of department.*

**906. Dynamic Production and Management Economics**

*Spring. 3(3-0) 805 or approval of department.*

Managerial processes in agriculture. The influence of management on resource allocation and efficiency in agriculture subject to imperfect knowledge of price, institutional, technological and human change.

**941. Agricultural Market Analysis**

*Spring of odd-numbered years. Summer of even-numbered years. 3(3-0) 841 or approval of department.*

Critical review of agricultural marketing research. Identification of current marketing problems and consideration of research approaches for the solution of these problems.

**960. Agricultural Policy in Developed Economies**

*Winter. 3(3-0) 460 and one year of graduate work in social science or approval of department.*

Sectoral interrelationships and the impact of economic policies relating to agriculture in advanced economies.

**962. Workshop on Planning and Implementation of Agricultural Development**

Spring. 3(3-0) 862; one year of graduate study in agricultural economics or economics or approval of department.

National planning problems with special reference to interrelationships between agricultural and industrial sectors in less developed countries. Regional and agricultural sector planning. Project preparation and appraisal. Implementation. Research for planning.

**972. Methodological Approaches to Research**

Fall of even-numbered years, Summer of odd-numbered years. 3(3-0) Two terms of graduate study in social science or approval of department. Interdepartmental with the Economics Department.

Selection, planning and conduct of research. Alternative research approaches. Role of theory, beliefs and valuations. Critical appraisal of research studies.

**990C. Mathematical Economics and Econometrics Workshop**

Fall, Winter, Spring. 3 to 16 credits. EC 812, 832, or approval of department. Interdepartmental with and administered by the Economics Department.

Critical evaluation of research reports by staff and other students. Students writing doctoral dissertations in the appropriate areas are encouraged to participate in workshop and may do so while registered for 999.

**999. Research**

Fall, Winter, Spring, Summer. Variable credit. Approval of department.

**AGRICULTURAL ENGINEERING**

A E

**College of Agriculture and Natural Resources**

**202. Physical Principles of Mechanical Processes**

Fall, Spring. 3(1-4)

Theory and skills in metallurgy, heat treating, cold metal, sheet metal, plumbing, arc and oxy-acetylene welding and machine operations.

**220. Engineering Principles Applied to Agriculture**

Winter. 4(3-2) MTH 108.

Physical principles and their application to agricultural production, distribution and processing.

**352. Physical Principles of Biological Processes**

Fall. 3(3-0) MTH 215, PHY 289.

Basic scientific principles and engineering theory applied to biological systems and products.

**353. Physical Principles of Plant Environment**

Winter. 3(3-0) 352, SLS 210.

Physical processes and properties of the biosphere as related to engineering the plant environment.

**354. Physical Principles of Animal Environment**

Spring. 3(2-2) 352.

Interrelationship of environmental factors and physiological responses of animals for planning, design and control of optimum environmental systems.

**402. Teaching Agricultural Mechanics**

Winter, Spring. 5(2-6) Juniors.

Teaching theory and developing skills in agricultural mechanics in secondary and vocational schools. School and farm shop planning and management. Emphasis on equipment and material selection, metallurgy, metal work and welding.

**416. Agricultural Structures**

Fall, Spring. 4(3-2) Juniors.

Functional planning and principles of environmental control, cost estimation, structural component analysis and properties of building materials.

**421. Electric Power**

Fall, Spring. 4(3-2) 220.

Application of electric energy to production and living; selection, installation, operation and control of electrical equipment.

**423. Principles of Processing Equipment**

Winter. 3(2-2) 220.

Principles of equipment used in the processing and storage of biological products.

**425. Farmstead Materials Handling**

Spring. 3(2-2) Juniors.

Systems and equipment for handling grain, hay, fertilizer, water and wastes on the farm. Systems design and evaluation.

**431. Principles of Irrigation, Drainage and Erosion Control**

Spring. 4(3-2) SLS 210.

Use of surveying, design, construction and cost estimates of drainage, irrigation and water control systems.

**432. Introduction to Meteorology**

For course description, see Interdisciplinary Courses.

**433. Introductory Meteorology Laboratory**

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.

**459. Special Problems**

Fall, Winter, Spring, Summer. 1 to 5 credits. May re-enroll for a maximum of 5 credits. Approval of department.

**461. Light Structure Analysis, Design and Synthesis**

Fall. 4(3-2) MMM 211.

Physical and chemical properties of engineering materials and interactions with bioclimatic conditions. Analysis and design of light structures. Functional planning and system synthesis.

**471. Electricity and Radiation**

Winter. 3(2-2) E E 345.

Characteristics, measurement and control of power and radiation in agriculture.

**474. Processing Biological Products**

Spring. 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.

**481. Soil and Water Engineering**

Spring. 5(4-2) M E 332.

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**

Fall. 4(3-2) 353.

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.