851. Program Administration and Supervision
Spring of odd-numbered years. 3(3-0)
ANR 806, EAD 113; EAD 114.
Principles and practices for developing, supervising, and administering agricultural and extension educational programs.

858. Leadership Development in Agricultural and Extension Education
Winter. 3(3-0) Approval of department.
Sociological and philosophical bases for leadership development for agricultural and extension education in a democratic society.

860. Program Evaluation
Summer of even-numbered years. 3(3-0) A/E 820 or approval of department.
Principles of evaluating agricultural and extension education programs.

881. Selected Topics
Fall, Winter, Spring, Summer. 1 to 6 credits. May reenroll for a maximum of 9 credits if different topics are taken. Approval of department.
Topics will be selected to meet needs of graduate students in agricultural and extension education.

883. Readings and Independent Study
Fall, Winter, Spring. 3 credits. May reenroll for a maximum of 6 credits. Approval of department.
Study on an individual and group basis in the various areas of agricultural and extension education.

899. Master's Thesis Research
Fall, Winter, Spring, Summer. 1 to 12 credits. May reenroll for a maximum of 12 credits. Approval of department.

999. Doctoral Dissertation Research
Fall, Winter, Spring, Summer. Variable credit. Approval of department.

Agricultural Economics (AEC)

College of Agriculture and Natural Resources

805. Agricultural Production Economics I
Fall. 4(4-0) PAM 340 or EC 325.

809. Institutions, Behavior, and Performance
Fall. 3(3-0) Approval of department.

810. Economics of Public Choice
Winter. 3(3-0) Approval of department.
Interdepartmental with the departments of Resource Development and Economics. Economics of alternative institutions for collective action. Emphasis on property rights and natural resources. Public goods, externalities, non-marginal change, commonwealth, income and power distribution, grants, welfare criteria and market failure.

811. Public Program Analysis
Spring. Summer of odd-numbered years, 3(3-0) EC 324 or approval of department.
Interdepartmental with the departments of Economics and Resource Development.
Application of benefit-cost analysis to public programs of resource development. Issues and case studies in budgeting, investment criteria, pricing, externalities, and coordination.

813. Food Marketing Management
Fall, Spring. 4(4-0) May reenroll for a maximum of 8 credits. Interdepartmental with and administered by the Department of Marketing and Transportation Administration.
Food industry adjustment to changing social, economic, and internal company environment. Managerial principles and techniques applied to food processing and distribution. Student interaction with industry, labor and government representatives.

831. Introduction to Econometrics
Spring, Summer. 3(3-0) EC 325, STT 422; not open to students with credit in EC 836.
Interdepartmental with and administered by the Department of Economics.

837. Applied Operations Research I
Spring. 4(4-0) MTH 113 or MTH 228; Approval of department.
Use and interpretation of operations research techniques for problems encountered by agricultural economists. Emphasis on linear programming and its variations such as transportation models, network analysis, spatial equilibrium models.

838. Applied Operations Research II
Summer. 2(3-0) MTH 113 or MTH 228, STT 422. Approval of department.
Use and interpretation of operations research techniques for problems encountered by agricultural economists. Emphasis on techniques such as Markov processes, dynamic programming, cohort analysis, queuing, Monte-Carlo techniques, elementary simulation.

841. Industrial Organization of Agricultural Markets
Fall. 3(3-0) Approval of department.

843. Commodity Market Analysis
Winter. 3(3-0) EC 423.
Economic forecasting in agricultural commodity markets, short run and long run. Futures markets, hedging, speculation. Plant location and size. Selected topics. Emphasis on techniques of use to firm managers.

851. Advanced Farm Management
Summer. 3(2-2) FSM 430 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 even-numbered years. Summer of even-numbered years. 3(3-0) EC 428 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) PAM 492 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.

865. Rural Development Administration
Winter. 3(3-0) Approval of department.
Concepts and principles of development administration and their application in the analysis of the processes and structures through which rural development activities are formulated and implemented in less developed countries.

868. Data Collection in Developing Countries
Winter. 3(3-0) PAM 228 or approval of department.
Principles for conducting household/village level studies of production and marketing in developing countries. Preparing research proposal, methodologies for data collection, processing and analysis. Field research administration.

876. Statistical Inference in Economics I
Fall. 3(3-0) EC 312A or EC 85A; STT 443 or STT 863; or approval of department.
Interdepartmental with the departments of Economics, and Statistics and Probability. Administered by the Department of Economics.

877. Statistical Inference in Economics II
Winter. 3(3-0) EC 376 or approval of department. Interdepartmental with the departments of Economics, and Statistics and Probability. Administered by the Department of Economics.
Agricultural Economics — Descriptions of Courses

587. Statistical Inference in Economics III
Spring. 3(3-0) EC 877 or approval of department. Interdepartmental with the departments of Economics, and Statistics and Probability. Administered by the Department of Economics.

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 Department of Economics. 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. 4(4-0) EC 821, or approval of department. Interdepartmental with and administered by the Department of Economics.

999. Doctoral Dissertation Research
Fall, Winter, Spring. Summer. Variable credit. Approval of department.

417. Land Economics
Fall, Spring. 4(4-0) Interdepartmental with Public Affairs Management and department of Resource Development, and Economics. Administered by the Department of Resource Development.

421. Policy and the Food System
Winter. 3(3-0) FSM 200 or EC 201, PAM 220 recommended.
Policy issues identified and analyzed in relation to performance goals of society and groups within the food system. Emphasis on price and income policies and regulations affecting the food system.

430. Advanced Food Processing and Distribution Management
Fall. 3(3-0) FSM 412.
Management applied to farms and input supply firms; computerized applications of budgeting and forward planning, income tax management, estate management, insurance, and risk and uncertainty.

439. Advanced Food Production and Distribution Management
Fall. 3(3-0) MTA 355. Interdepartmental with and administered by the Department of Marketing and Transportation Administration.
Managerial principles and techniques applied to food processing and distribution. Emphasizes adjustment to changing social, economic and internal company environment. Student interaction with industry, labor and government representatives. Field trips, special projects.

441. Commodity and Futures Marketing
Spring. 3(3-0) STT 201, EC 201; FSM 370 or STT 317 recommended.
Commodity pricing and use of marketing alternatives. Special emphasis on the futures markets and the institutional arrangements useful to farmers, elevator operators and commodity traders.

443. Cooperatives: Group Action in Marketing
Spring. 3(3-0) EC 200, Juniors, or approval of department.
Organization and operation of cooperatives. Emphasis on economics, legal foundations, and feasibility of cooperatives and other forms of group action in the U.S. food system.

460. Regional Economics
Winter. 4(4-0) R D 417 or EC 324. Interdepartmental with Public Affairs Management and the departments of Economics and Resource Development. Administered by the Department of Resource Development.
Ferries affecting location decisions of firms, households and governments. Applications to agricultural, industrial, and regional developments.

461. Regional Economics Laboratory
Evaluation and use of analytical models designed to solve regional economic problems.
Descriptions — Agricultural Economics

Courses

462. Agriculture and Rural Development in Developing Nations
Fall. 3(3-0) PAM 201 or EC 201; PAM 260 recommended. Interdepartmental with Public Affairs Management and Agriculture and Natural Resources. 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.

480. Independent and Supervised Study
Fall, Winter, Spring, Summer. 1 to 9 credits. May reenroll for a maximum of 9 credits. Approval of department.

Public Affairs Management PAM

201. Introduction to Community Economics
Fall, Spring. 3(3-0) Identification and analysis of problems faced by public decision makers in managing public revenues and services and governing private resource use. Impact of political and economic structures on resource use.

260. World Food, Population and Poverty
Winter. 3(3-0) Description, analysis and alternative solutions of food, technology transfer, population and poverty problems, emphasizing trade and aid programs and the role of multinational firms in low income nations.

303. Welfare, Health and Education Policy
Fall. 3(3-0) PAM 201 or EC 200. Evaluation of selected welfare, health and education policies and alternatives. Role of public and private sectors. Impact of values, beliefs, costs, benefit distributions, political power and other factors on policy.

306. Government Programs for Workers
Winter, Spring. 4(4-0) EC 201. Interdepartmental with and administered by the Department of Economics. Economics of selected government institutions and programs for workers. Social security, worker's compensation, unemployment insurance, OSHA, employment and training programs, wages and hours legislation, anti-discrimination programs.

320. Economic Policy Processes I
Fall. 3(3-0) PAM 201 or EC 201. Analysis of processes by which public economic policy is established at various levels of government. Role of economic interests and pressures. Alternative processes for economic policy formulation. Case studies.

321. Economic Policy Processes II
Winter. 3(3-0) PAM 390 or approval of department. Analysis of socioeconomic forces as they affect the public decision process for economic policy. Means of increasing effectiveness of staff persons in the decision process. Case studies.

340. Managerial Economics
Spring. 3(3-0) EC 201. Production, consumption decisions and their interrelation. Pricing of market and non-market goods. Effects of monetary and fiscal policies. Applications to problems in food system or community management.

363. Economic Development of Tropical Africa
Spring. 3(3-0) EC 200 and EC 201, or EC 210. Interdepartmental with and administered by the Department of Economics. African economic development in historical perspective. Analysis of contemporary economic development problems faced by tropical African countries. Alternative strategies for African economic development.

370. Applied Statistics
Winter. 3(3-0) One course in statistics, one course in food systems economics and management or public affairs management. Interdepartmental with Food Systems Economics and Management. Interpretation and use of statistical results in decision making. Sampling index numbers, tabular analysis, trend estimation, regression models, decision theory.

404. Social Accounts and Community Choice
Winter. 3(3-0) PAM 303 or approval of department. Social accounting as a framework for problem definition and measurement of policy effectiveness. Conceptualization of social accounts. Use of selected social indicators in policy formulation and decision making.

406. Public Expenditure: Theory and Policy
Fall, Spring. 4(4-0) EC 201 or EC 210. Interdepartmental with and administered by the Department of Economics. Expenditure theory; objectives and rationale of government activity in the market system; efficiency criteria in government decision making; planning-programming-budgeting systems and cost-benefit analysis.

417. Land Economics
Fall, Spring. 4(4-0) Interdepartmental with Food Systems Economics and Management and the departments of Economics, and Resource Development. Administered by the Department of Resource Development. Factors affecting the economic use of land and space resources by people. Input-output relationships; development, investment, and enterprise location decisions. Land markets, property rights, area planning, zoning and land use controls.

431. Law and Social Change
Fall, Spring. 3(3-0) GBL 430 or approval of department. Interdepartmental with and administered by the Department of Resource Development. Law as applied to urban and rural context of social change. A review of both formal and informal aspects of system accessibility, institutional formation, government, civil rights, and human service.

453. Women and Work: Issues and Policy Analysis
Winter. 3(3-0) PAM 201 or EC 200 or EC 201 or approval of department. Interdepartmental with the Department of Economics. Quantity and quality of labor force participation by women, current status and past trends. Issues analyzed include differential earnings and occupations of men and women, employment discrimination and labor legislation.

460. Regional Economics

461. Regional Economics Laboratory

462. Agricultural and Rural Development in Developing Nations
Fall. 3(3-0) PAM 201 or EC 201; PAM 260 recommended. Interdepartmental with Agriculture and Natural Resources, and 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.

480. Independent and Supervised Study
Fall, Winter, Spring, Summer. 1 to 9 credits. May reenroll for a maximum of 9 credits. Approval of department.

484. Selected Topics
Fall, Winter, Spring, Summer. 1 to 4 credits. May reenroll for a maximum of 12 credits if different topics are taken. Approval of department.

490. Supervised Field Experience
Fall, Winter, Spring, Summer. 3 to 9 credits. May reenroll for a maximum of 9 credits. PAM juniors, approval of department. Supervised field work in federal, state, or local government or organizations dealing with government.

AGRICULTURAL ENGINEERING

College of Agriculture and Natural Resources

152. Introduction to Agricultural Engineering
Fall, Spring. 1(1-0) Interdepartmental with Agricultural Engineering Technology. An introduction to the agricultural engineering profession with an examination of existing problems.

352. Physical Principles of Biological Processes
Winter. 4(4-0) A E 253. Basic scientific principles and engineering theory applied to biological systems and products.