321. Economic Policy Processes II
Winter. 3(3-0) 320.
Continuation of 320 with emphasis on behavioral analysis and simulated participation in the process through case examples and problems.

340. Managerial Economics
Spring. 3(3-0) One 300 level food systems economics and management or public affairs management course. Interdepartmental with Food Systems Economics and Management. 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.

383. Economic Development of Tropical Africa
Spring. 3(3-0) EC 200 and 201, or 210. Interdepartmental with and administered by the Economics Department.

370. Applied Statistics
Winter. 3(3-0) Students may not receive credit for both PAM 370 and AEC 430. 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.

401. Production Economics and Management
(AEC 401.) Fall. Summer of even-numbered years. 4(4-0) 340 or approval of department. Interdepartmental with the Resource Development Department and Food Systems Economics and Management and administered by Food Systems Economics and Management.

404. Social Accounts and Community Choice
Winter. 3(3-0) 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.

Fall, Spring. 4(4-0) EC 201 or 210. Interdepartmental with and administered by the Economics Department.
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 the Resource Development and Economics Departments and Food Systems Economics and Management 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.

460. Location Analysis
Winter. 4(4-0) 417 or 401 or EC 324. Interdepartmental with the Resource Development and Economics Departments, and Food Systems Economics and Management and administered by the Resource Development Department.
Factors affecting location decisions of firms, households, and governments. Applications to agricultural, industrial, and regional development.

462. Rural Transformation in Developing Societies
(AEC 462.) Fall. 3(3-0) PAM 201 or EC 201; PAM 260 recommended. Interdepartmental with Agriculture 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.

473. Introduction to Systems Analysis
Spring. 3(3-0) MTH 111. Interdepartmental with Food Systems Economics and Management.
Principles of systems analysis applied to economic, physical, and social phenomena. Case studies. Interpretation and design of systems models. Systems concepts in decision making.

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

AGRICULTURAL ENGINEERING A E

College of Agriculture and Natural Resources

202. Physical Principles of Mechanical Processes
Fall. Spring. 3(2-2)
Theory and skills in metallurgy, heat treating, cold metal, sheet metal, plumbing, 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.

243. Automotive and Recreational Engines
Spring. 3(3-0)
The principles and maintenance of engines used in automobiles and recreational vehicles. Fuels, lubricants and emission control. Basic engineering principles are developed in a manner that requires no prior technical training.

252. Introduction to Agricultural Engineering I
Fall. 1(1-0)
An introduction to the Agricultural Engineering profession with an examination of existing problems.

253. Introduction to Agricultural Engineering II
Winter. 1(1-0)
Communication techniques, library use, letter and technical report writing techniques as used in the Agricultural Engineering profession.

254. Introduction to Agricultural Engineering III
Spring. 3(3-0)
An analysis of the Agricultural Engineering profession with an examination of educational requirements for employment in various areas of the profession.

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

354. Physical Principles of Animal Environment
Spring. 3(3-0) 352
Interrelationship of environmental factors and physiological responses of animals for planning, design and control of optimum environmental systems.

355. Principles of Structures and Machines
Winter. 3(3-0) MMM 211
Stress and deflection analysis of simple structures and machines. Estimation of loads and selection of materials. Course will be oriented towards applications in agricultural engineering.

402. Teaching Agricultural Mechanics
Winter, Spring. 5(3-0) 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, metalurgy, 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) 230
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) 320
Principles of equipment used in the processing and storage of biological products.

425. Farmstead Materials Handling
Spring. 3(3-2) Juniors
Systems and equipment for handling grain, hay, fertilizer, water and wastes on the farm. System 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.

434. Microclimatology
For course description, see Interdisciplinary Courses.

437. Principles of Food Engineering
Winter. 3(2-0) 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 machinery. Selection, care and operation of agricultural machinery for obtaining optimum conditions for crop production.

445. Hydraulic Power Transmission
Winter. 3(2-2) MTH 111, PHY 227.
Pressures, flows and losses in hydraulic power transmission systems. Operation and performance of pumps, valves, actuators, and complete systems found on agricultural and light industrial mobile equipment.

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

482. Pollution Control
Winter of even-numbered years. 4(3-2)
Application of biological, chemical, physical and engineering principles of pollution control to optimize the production and processing of food and fiber with respect to the quality of the total environment.

471. Electric Power and Control
Fall. 4(3-2) E E 345.
Electric motors, controls and circuits; switching logic, devices and circuit design.

474. Processing Biological Products
Winter of odd-numbered years. 4(3-2)
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. 3(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)
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.
Analysis, design and construction of drainage, irrigation and erosion control systems.

493. Energy Conversion Systems
Spring. 4(2-2) 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)
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.

805. Environmental Measurements
Fall. 4(2-3)
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 micrometeorites will be discussed.

806. Analysis of Agricultural Systems
Spring. 3(3-0) SYS 810.
Identification and definition of systems problems in agriculture. Model formulation and estimation. Several models of current interest are considered.

807. Man-Machine Relationships
Fall. 3(3-0) Approval of department.
Analysis of machine design, operation and working environment in relation to human limitations and capabilities, analysis of procedures used to develop maximum compatibility between man and machine.

811. Technical Problems
Fall, Winter, Spring, Summer. 1 to 4 credits. May re-enroll for a maximum of 8 credits.

812. Bio-Processing Engineering
Winter. 3(3-2) 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(3-2) Approval of department.
Physical and mechanical behavior of fruits and vegetables, forage, 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(3-2) 493, 494.
Analysis of agricultural machinery 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.

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

Agriculture - Descriptions

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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.

350. Leadership Development for Agriculture and Natural Resources
Winter, Spring. 3(3-0) May re-enroll for a maximum of 6 credits. Approval of department. Interdepartmental with Natural Resources.

401. Agriculture and Natural Resources Communications
Winter. Spring. 3(3-2) JRN 303 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.