321. Economic Policy Processes II
Winter. 3(3-0) 320 or approval of department.
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) EC 201. 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.

363. 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 in both PAM 370 and AEC 830. 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. 4(4-0) Not open to graduates in Agricultural Economics, Economics or Resource Development. 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 Department, and Food Systems Economics and Management and administered by the Resource Development Department.
Forces affecting location decisions of firms, households and governments. Applications to problems in food system or community management.

462. Agricultural and Rural Development in Developing Nations
(AEC 462.) Fall. 3(3-0) 201 or EC 201; PAM 260 recommended. Interdepartmental with Agricultural 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 agri-cultural 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, agricultural and social phenomena. Case studies. Interpretation and design of systems models. Systems concepts in decision making.

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

AGRICULTURAL ENGINEERING

College of Agriculture and Natural Resources

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

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

154. Introduction to Agricultural Engineering III
(254.) Spring. 1(1-0)
An analysis of the agricultural engineering profession with an examination of educational requirements for employment in various areas of the profession.

200. Computers and Information Processing in Agriculture and Natural Resources
Spring. 3(3-0)
Evaluation of the present and future role and application of electronic computers in the area of agriculture and natural resources.

202. Physical Principles of Mechanical Processes
Fall, Spring. 3(1-4)
Theory and skills in metalurgy, heat treating, cold metal, sheet metal, plumbing, and oxy-arc tungsten carbon arc welding and machine operations.

239. Housing Conservation
Spring. 2(2-0)
Skills and techniques in conserving, repairing and remodeling existing housing. Structural components of housing and evaluation of housing structure.

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.

352. Physical Principles of Biological Systems
Fall. 3(3-0)
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.
Interrelationships 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) MME 311.
Stress and deflection analysis of simple structures and members. Estimation of loads and selection of materials. Course will be oriented towards applications in agricultural engineering.

402. Teaching Agricultural Mechanics
Winter, Spring. 3(2-6) Juniors.
Teaching theory and developing skills in agricultural mechanics in secondary and vocational schools. Teaching farm shop planning and management. Emphasis on equipment and material selection, metallurgy, metal work and welding.

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

4DC. Introduction to Meteorology
Fall. 1(1-0)
For course description, see Interdisciplinary Courses.

4DC. Introduction to Meteorology Laboratory
For course description, see Interdisciplinary Courses.

4DC. Microclimatology
For course description, see Interdisciplinary Courses.

437. Principles of Food Engineering
Winter. 3(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.

444. Agricultural Production Machinery
Spring. 3(2-2).
Basic principles of agricultural machines. Selection, care and operation of agricultural machinery for obtaining optimum conditions for crop production.
454. **Hydraulic Power Transmission**
   Winter. 3(3-3) MTH 111, PHY 237.
   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.

461. **Pollution Control**
   Winter of even-numbered years. 3(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.

470. **Electric Power and Control**
   Fall. 4(3-2) E E 346.
   Electric motors, controls and circuits; switching logic, devices and circuit design.

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.

486. **Soil and Water Engineering**
   Spring of even-numbered years. 4(3-2)
   M E 322 or C E 332.
   Engineering analysis, design and construction of drainage, irrigation and erosion control systems.

492. **Energy Conversion Systems**
   Spring. 4(3-3) M E 311.
   Principles of energy conversion with emphasis on the internal combustion engine. Thermodynamic analysis, performance characteristics, and power transmission.

498. **Systems of Agricultural Machines**
   Spring of even-numbered years. 4(3-2)
   M E 322 or C E 332.
   Systems of machines used in field and farm-stand operations. Engineering principles for machines dealing with biological materials.

504. **Agricultural Mechanization in Developing Countries**
   Spring. 3(3-0) Approval of department.

805. **Environmental Measurements**
   Fall. 4(3-3)
   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 microclimates will be discussed.

811. **Technical Problems**
   Fall, Winter, Spring, Summer. 1 to 4 credits. May re-enroll for a maximum of 9 credits. Approval of department.

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.

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.
   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) 492, 494.
   Analysis of agricultural machine 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.

900. **Advanced Topics in Agricultural Engineering**
   Fall, Winter, Spring. 3(3-0) May re-enroll for a maximum of 9 credits. Approval of department.
   New developments in agricultural engineering. Subjects to be covered include atmospheric turbulence, optimization of agricultural systems, measurement systems, food engineering, agricultural rheology and finite element methods.

AGRICULTURE AG

College of Agriculture and Natural Resources

124A. Introduction to Careers in Vocational and Practical Arts Education—Agriculture Fall. 2(2-2) Interdepartmental with and administered by Education.

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. Leadership development. Preparation for community leadership. Firsthand look at social, economic, and political problems. Series of seminars, interviews, field trips. Emphasis on awareness, action, and involvement.

399. Agriculture Internship Fall, Winter, Spring, Summer. Zero credit. [10 credits] Juniors and approval of department. Interdepartmental with Natural Resources. An opportunity for exposure to the applied aspects of a student's major. Supervision and evaluation conducted by faculty and cooperating agencies.

401. Agriculture and Natural Resources Communications Winter, Spring. 3(3-2) JRN 501 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.

402. Agriculture and Natural Resources Communications Internship Fall, Winter, Spring, Summer. 1 to 6 credits. May re-enroll for a maximum of 6 credits. 401, approval of college. Internship with professionals in communications field with emphasis on student's areas of interest —writing, radio, TV, publications, etc.

425. Agriculture and Natural Resources Seminar Spring. 2(2-0) Interdepartmental with Natural Resources. Current agricultural, natural resource, and environmental problems and solutions as presented by discussion leaders from various disciplines, arranged by undergraduate students.

1See page A-2, item 3.

1DC. The Impact of Animal Resource Management Upon the World's Developing Nations

For course description, see Interdisciplinary Courses.

462. Agricultural and Rural Development in Developing Nations Fall. 3(3-0) PAM 201 or EC 201; PAM 260 recommended. Interdepartmental with Public Affairs Management and Food Systems Economics and Management and administered by Food Systems Economics and Management. Traditional agricultural systems and the incentives of economic growth in rural areas. Adjustment to technological, institutional and human change. Strategies for rapid agricultural transformation.

471. Environmental Topics in Nonmetropolitan Regions Fall. 4(4-0) Nomination of students by each department and approved by participating faculty. Interdepartmental with the College of Natural Science and Natural Resources and administered by Natural Resources. Environmental topics in nonmetropolitan regions including issues on: production agriculture, service industries, non-agricultural uses, rural urban balance, discussion topics and case studies.

475. International Studies in Agriculture and Natural Resources Spring, Summer. 3 to 9 credits. Approval of the college. Interdepartmental with Natural Resources. Study-travel experience emphasizing contemporary problems affecting agriculture in the world, national, and local communities. Field trips, case studies, interviews with leading experts, government officials, community leaders. Supervised individual study.

AMERICAN STUDIES AMS

College of Arts and Letters

301. Issues in American Civilization Fall, Winter, Spring. 3(3-0) May re-enroll for a maximum of 9 credits. Not applicable to major requirements. Selected issues in American life past and present, with materials drawn from such disciplines as history, social sciences, philosophy, literature and the arts. Topics vary.

410. Perspectives in American Studies Fall. 3 credits. Juniors in American Studies or approval of American Studies Committee. Methods and significant works; for majors in the American Studies program. Offered by members of the relevant departments.

411. Problems in American Civilization Winter, Spring. 3 credits. Majors must re-enroll for a maximum of 6 credits. 410, Juniors in American Studies or approval of American Studies Committee. Seminar approach to selected problems in American life employing the objectives and approaches of interdisciplinary studies. Offered by members of relevant departments, for majors in the American Studies program.

AMERICAN THOUGHT AND LANGUAGE ATL

University College

Students may earn credit in only one of the courses in each of the following three groups:

1. 121, 131, 141, 151, 161, 171, 181, 191
   101A.
   101B.

2. 122, 132, 142, 152, 162, 172, 182, 192
   101A.
   101B.

3. 133, 143, 153, 163, 173, 183, 193
   101A.
   101B.

101A. Comprehensive English
Fall, Winter, Spring, Summer. 3(3-0) No student may receive credit in both 101A and 101B. Admission by examination or approval of department. Instruction and practice in reading and writing. Emphasis upon mastery of fundamental skills needed for a variety of reading and writing assignments.

101B. Comprehensive English
Fall, Winter, Spring, Summer. 3(3-0) No student may receive credit in both 101A and 101B. Admission by examination or approval of department. Instruction and practice in reading and writing. Emphasis upon mastery of fundamental skills needed for a variety of reading and writing assignments.

121. American Expression
Fall, Winter, Spring, Summer. 3(3-0) Satisfactory grade on English proficiency examination or in Comprehensive English. Aims to improve the student's ability to read and write and to acquaint him with his American heritage. Selected reading and theme topics.

122. American Expression
Fall, Winter, Spring, Summer. 3(3-0) Three credits in the first term of any ATL sequence numbered 121 or above; or satisfactory performance in Comprehensive English. Aims to improve the student's ability to read and write, and to acquaint him with his American heritage. Selected reading and theme topics.

123. American Expression
Fall, Winter, Spring, Summer. 3(3-0) Three credits in the second term of any ATL sequence numbered 121 or above; or satisfactory performance in Comprehensive English. Aims to improve the student's ability to read and write, and to acquaint him with his American heritage. Selected reading and theme topics.

131. Major Documents in American Experience
Fall, Winter, Spring, Summer. 3(3-0) Satisfactory grade on English proficiency examination or in Comprehensive English. Aims to acquaint the student with significant works, and to improves his abilities at reading and writing. Selected readings and theme topics.

A-11