Agricultural Engineering - Descriptions of Courses

474. Processing Biological Products
Winter. 3(3-0) A E 352, M E 311 or CEM 361
Engineering principles of steady-state heat transfer, heat exchangers, drying, storage and refrigeration as applied to the processing of biological products.

480. Special Problems
Fall, Winter, Spring. Summer 1 to 3 credits. May reenroll for a maximum of 5 credits. Approval of department.
Individual student research and study in agricultural machines, tractors, waste management, food processing, structures and environment, materials processing and handling, water management, meteorology and climatology, agricultural systems analysis.

481. Soil and Water Conservation Engineering
Winter. 4(4-0) C F 321, A E 353
Engineering analysis, design and construction of drainage, irrigation and erosion control systems.

482. Irrigation Design Management
Spring. 4(3-2) A E 451
Water supply including wells, water transport, pumping and pump selection, water requirements, power supplies and irrigation equipment with emphasis on sprinkler and trickle methods and design for agricultural application.

492. Tractors and Power Transmission Systems
Winter. 4(4-0) A E 394
Functional requirements, operational characteristics, analysis and design of tractors including power trains, hydraulics, traction, hitches, vehicle dynamics and operator comfort.

493. Power and Control Hydraulics
Winter. 3(3-2) CPS 120, C E 321
Properties of hydraulic fluids, performance parameters of fixed and variable displacement pumps and motors, characteristics of control valves and components, analysis and design of hydraulic systems.

495. Fundamentals of Design
Spring. 3(3-0) Third-term junior majors or approval of department.
Problem identification, working models, procedures, and developing specifications. Selection of individual design problem for A E 496 and A E 497.

496. Design Project Laboratory
Fall, Winter, Summer. 1 to 4 credits. May reenroll for a maximum of 4 credits. A E 495.
Individual or team pursuit of the design project selected in A E 495. Activities include information expansion, developing alternatives, evaluation and selection, and concluding project.

809. Finite Element Method
Fall. 4(4-0) Approval of department. Interdepartmental with the Department of Metallurgy, Mechanics and Materials Science, and Civil Engineering. Administered by the Department of Metallurgy, Mechanics and Materials Science.
Theory and application of the finite element method to the solution of continuum type problems in heat transfer, fluid mechanics and stress analysis.
Descriptions — Agricultural Engineering of Courses

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 Winter, 3-3-0
A E 394, A E 492
Analysis of agricultural machine components and systems. Emphasis on hydraulic power transmission, controls, and management of machine systems.

850. Special Problems Fall, Winter, Spring, Summer, 1 to 4 credits. May enroll for a maximum of 5 credits. Approval of department.
Individual student research and study in agricultural machines and tractors, waste management, food processing, structures and environment, materials processing and handling, water management, meteorology and climatology, agricultural systems analysis.

899. Master’s Thesis Research Fall, Winter, Spring, Summer. Variable credit. Approval of department.

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

Agricultural Engineering Technology AET

152. Introduction to Agricultural Engineering Fall, Spring, 3-3-0
Interdepartmental with and administered by the Department of Agricultural Engineering.
An introduction to the agricultural engineering profession with an examination of existing problems.

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

201. Technical Agricultural Mechanics Skills (A E 402) Fall, 3-3-0
Major or minor in vocational agriculture or major or minor in Agribusiness and Natural Resources Education or approval of department.
Basic principles, applications, techniques, tools, materials, and resources in agricultural mechanics skills.

202. Agricultural Metalworking (A E 202) Winter, 3-3-0
Principles, skills and safety for welding, soldering, brazing, cutting, bench work, metalurgy, fastening and shop tools. Maintenance metalworking for farm and agribusiness shops will be emphasized.

243. Automotive and Recreational Engines Laboratory (A E 243) Spring, 3-2-0
The principles and maintenance of engines used in automobiles and recreational vehicles. Fuels, lubrication, and emission control. Basic engineering principles are developed in a manner that requires no prior technical training.

244. Automotive and Recreational Engines Laboratory (A E 244) Spring, 1-0-2
Laboratory experiences in engine maintenance, ignition principles and testing equipment.

255. Technical Skills Fall, Winter, Spring. 1 to 7 credits.
May enroll for a maximum of 10 credits. Majors or approval of department.
Selection, operation, and maintenance of physical components of electrical, mechanical, environmental and water management systems in agriculture and natural resources industries, including system design and component installation.

322. Systems Analysis in Agricultural Production Fall, 3-3-0
MTH 111 or MTH 109, CPS 110 or CPS 120.
Simulation of processes and operations for feed, feed, fiber and energy flow in agriculture and natural resources. Analysis of interrelationships between physical systems.

323. Mechanical Systems in Agriculture and Natural Resources Winter, 4-4-0
PHY 237, PHY 257.
Phenomenological aspects of the laws of mechanics and their influence on the design of mechanical and structural systems encountered in agriculture and natural resources.

324. Processing Systems for Biological Products Winter, 4-4-0
MTH 109 or MTH 111, PHY 237.
Physical processes which influence biological products during production, handling, processing and distribution. Mass and heat balances, fluid flow, steam generation, psychrometry, heat exchange, refrigeration and dehydration will be discussed.

329. Unit Operation and Food Processing I Fall, 4-3-2
PHY 237, MTH 109.
Interdepartmental with Food Science.
Engineering concepts related to the unit operations found in the food industry. Fluid mechanics, heat transfer and rate processes including psychrometry and refrigeration.

341. Energy in the Food System Winter, 3-3-0
Juniors or approval of department. Interdepartmental with Agriculture and Natural Resources.

401. Teaching Agricultural Mechanics (A E 402) Spring, 3-3-0
AET 201; AET 202 or AET 243 and AET 244, ED 327A.
Teaching techniques in agricultural mechanics for secondary and vocational schools. Shop planning and management.

415. Agricultural and Natural Resources Safety Winter, 3-3-0
Juniors. Principles of safety problems solving. Accident causation and prevention: laws and regulations; machinery, electrical, chemical, livestock, shop and fire safety; security; and safety program development.

416. Light Structural Systems Fall, 4-4-0
PHY 237 or approval of department.
Functional planning of animal structures. Properties of building materials and selecting building components to satisfy requirements of light structures.

421. Electrical Energy Utilization Spring, 4-3-2
PHY 238 or approval of department.
Efficient utilization of electrical energy: selection, operation and control of electrical equipment. Design of electrical systems.

431. Irrigation, Drainage and Erosion Control Systems Spring, 4-3-2
CPS 210 or approval of department.
Use of surveying, design, construction and cost estimates of drainage irrigation and water control systems.

443. Machinery and Tractor Systems Fall, 4-3-2
AET 243 or approval of department.
Characteristics of basic agricultural field machinery. Diesel engine, fuel injection and combustion chamber characteristics. Torque and power transmission, tractor stability and implementation hitching.

450. Special Problems Fall, Winter, Spring, Summer. 1 to 5 credits. May enroll for a maximum of 5 credits. Approval of department.
Individual student research and study in: agricultural machines and tractors, waste management, food processing, structures and environment, materials processing and handling, water management, meteorology and climatology, agricultural systems analysis.

804. Agricultural Mechanization in Developing Countries (A E 504) Spring, 3-3-0
Interdepartmental with and administered by the Department of Agricultural Engineering.
Appropriate agricultural mechanization with emphasis on hand, animal, and mechanical equipment for the smaller farms. Machine selection, local manufacturing, public and private costs, ownership patterns, increasing production and decreasing post-production losses.
Agriculture and Natural Resources Descriptions of Courses

805. Environmental Measurements
(A E 805.) 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.

806. Analysis of Agricultural Systems
(A E 806.) Winter. 3(3-0) SY 810.
Identification and definition of systems problems in agriculture. Model formulation and evaluation. Several models of current interest are considered.

97. Man-Machine Relationships
(A E 807.) 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.

999. Master's Thesis Research
Fall, Winter, Spring, Summer. Variable credit. May reenroll for a maximum of 15 credits. Approval of department.

999. Doctoral Dissertation Research
Fall, Winter, Spring. Summer. Variable credit. May reenroll for a maximum of 36 credits. Approval of department.

Building Construction

200. Dynamics of American Housing
Fall, Winter, Spring, Summer. 3(3-0)
Impact of housing on the economic and social welfare of America. Analysis of the residential building industry and its problems in providing adequate housing.

239. Housing Conservation
(A E 236, AE 239.) Spring. 3(3-0) Interdepartmental with the Department of Human Environment and Design.
Skills and techniques in conserving, repairing and remodeling existing housing. Structural components of housing and evaluation of housing structure.

312. Structural Design
Winter. 4(4-0) PHY 237.
Consideration of structural design systems as used in light construction.

412. Housing Utilities Design
Winter. 4(4-0) PHY 238, EGR 465 or approval of department.
Design of planning for mechanical and electrical utilities in housing.

413. Residential Construction Systems
Spring. 4(3-2) PHY 239, B C 312 or approval of department.
Analysis of the primary construction systems employed in the residential building industry, especially the economic and social aspects in meeting the housing goals of the U. S.

415. Building Materials
Spring. 4(4-0) PHY 239, B C 312 or approval of department.
Properties of building materials pertinent to their application and performance in service.

416. Building Costs
Fall. 4(3-4) EGR 364 or approval of department.
Methods of cost estimating. Effects of codes and production practices on costs.

417. Residential Finance
Winter. 4(4-0) AFA 395 or approval of department.
Analysis of financial programs for the construction, rehabilitation, remodeling and purchase of homes; especially meeting the nation's goals for low to moderate income housing.

418. Special Problems
Fall, Winter, Spring, Summer. 1 to 3 credits. May reenroll for a maximum of 9 credits. Written approval of department.
Special problems in the areas of acquisition and development of residential land; design, construction technology, building materials, finance, marketing, construction management and land use codes and regulations.

20. Construction Management
Spring. 4(4-0) Senior majors or approval of department.
Systems management techniques for residential building organizations inclusive of organization development, operations, planning, scheduling and control, and administrative systems and procedures.

835. Research in Building Construction
Fall, Winter, Spring, Summer. Variable credit. Approval of department.

880. Special Problems
Fall, Winter, Spring, Summer. 1 to 4 credits. May reenroll for a maximum of 9 credits. Approval of department.
Individual student research and study in land acquisition and development, design, construction, management, finance, marketing, and structural analysis.

899. Master's Thesis Research
Fall, Winter, Spring, Summer. Variable credit. Approval of department.

AGRICULTURAL ENGINEERING TECHNOLOGY

See Agricultural Engineering.

AGRICULTURE AND NATURAL RESOURCES

College of Agriculture and Natural Resources

220. Plants and Their Environment
(NR 220.) Winter. 3(3-0) Interdepartmental with and administered by the Department of Forestry.
Relationships between plants and fundamental climatic, edaphic, and biotic factors; structure and function of different ecosystems in relation to environmental factors.

275. Exploring International Agriculture
(AG 275.) Spring. 3(3-0)
Exploration of overseas assignments with international agencies; potential world food actualities and potentialities; special problems of the tropics compared with those in temperate regions.

290. Selected Topics
Fall, Winter, Spring, Summer. 1 to 4 credits. May reenroll for a maximum of 6 credits if different topics are taken. Approval of department.

341. Energy in the Food System
(AG 341.) Winter, Spring. 3(3-0) Approval of department. Interdepartmental with and administered by Agricultural Engineering Technology.

350. Leadership Development for Agriculture and Natural Resources
(AG 350.) Winter, Spring. 3(3-0) May reenroll for a maximum of 9 credits. Approval of department.

399. Professional Internships in Agriculture and Natural Resources Communications
(AG 399.) Fall. Winter, Spring, Summer. Zero to 10 credits. [10 credits.] Approval of department.
Professionalized experiences in a student's major. Supervision and evaluation by faculty and cooperating agencies.

401. Agriculture and Natural Resources Communications Internship
(AG 401.) Fall, Winter, Spring. 3(2-2)
JRN 201 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
(AG 402.) Fall, Winter, Spring, Summer. 1 to 6 credits. May reenroll for a maximum of 5 credits. ANR 401, approval of college.
Internship with professionals in communications field with emphasis on student's areas of interest—writing, radio, TV, publications, etc.

410. Environmental Toxicology
(AG 410.) Winter. 4(4-0) B S 212, BCH 401. Interdepartmental with and administered by the College of Natural Science.
Fate and effects of toxic chemicals in soil, plants, wildlife, and aquatic systems. Interactions between chemicals and the environment which influence their fate and ecological importance.