

Course Catalog - Spring 2006

Agricultural and Biological Engineering

100 **Intro to Agr Engineering** Credit: 1 hours.

Introduction to the engineering profession with career opportunities in the agricultural engineering discipline. Interactive class activities include concepts necessary for becoming a successful engineer including time management, design concepts, ethics, and teambuilding. Students become familiar with laboratories, computer facilities, internships and other opportunities that are available to agricultural engineering students. A team design experience is included. Class emphasis on technical communication and problem-solving skills as well as career planning. Approved for both letter and S/U grading.

199 **Undergraduate Open Seminar** Credit: 1 to 5 hours.

Experimental course on a special topic in Agricultural Engineering. May be repeated to a maximum of 12 hours.

221 **Agr & Bio Engineering I** Credit: 4 hours.

Introduction to engineering methods used in the design and management of agricultural, biological and environmental systems. Topics covered include the hydrologic cycle, soil-water properties and relationships, water runoff, surveying, soil erosion, water management, engine power, fluid power, traction and weight transfer, and off-road vehicle systems. Prerequisite: MATH 220, calculus and analytical geometry, or equivalent.

222 **Agr & Bio Engineering II** Credit: 4 hours.

Introduction to biomaterials and bioprocess design. Includes structure and composition of biomaterials, mass balances, force-deformation of biomaterials and non-Newtonian fluid flow. Principles of environmental control for biological structures, psychrometrics, mass and heat transfer through buildings, and ventilation requirements. Prerequisite: MATH 220, calculus and analytical geometry, or equivalent.

293 **Off-Campus Internship** Credit: 1 to 4 hours.

Supervised, off-campus experience in a field directly pertaining to a subject matter in agricultural engineering. May be repeated to a maximum of 8 hours. Prerequisite: Sophomore standing and consent of instructor.

295 **Independent Study** Credit: 1 to 4 hours.

Individual research, special problems, thesis, development and/or design work under the supervision of a member of the faculty. May be repeated to a maximum of 8 hours.

361 **Princ of Off-Road Machines** Credit: 3 hours.

Design and development concepts of agricultural and industrial machines; analysis and synthesis of tillage, planting, harvesting, chemical application, material handling mechanisms, and precision farming tools. Includes laboratory. Prerequisite: ABE 221 and TAM 212.

374 **Env Control for Bio Buildings** Credit: 3 hours.

Application of bioenvironmental engineering principles to control agricultural building environments. Psychrometrics, room air distribution, fluids, heat transfer, ventilation equipment, environmental physiology and design topics. Includes laboratory. Prerequisite: ABE 222.

396 **UG Honors Research or Thesis** Credit: 1 to 4 hours.

Individual research, special problems, thesis, development and/or design work under the direction of the honors advisor. May be repeated to a maximum of 8 hours. Prerequisite: Junior standing, admission to the ACES Honors Program or James Scholar Program in Engineering, and consent of instructor.

398 **Special Topics** Credit: 1 to 3 hours.

Group discussion or an experimental course on a special topic in agricultural engineering. May be repeated to a maximum of 12 hours.

420 **Kinem and Dynm of Mechani Sys** Credit: 3 hours.

Same as ME 440. See ME 440.

425 Eng Measurement Systems Credit: 4 hours.

Emphasizes fundamental and integrated skills in designing engineering measurement systems and performing engineering measurements. Main topics include design of engineering measurement systems, principles of sensors, signal conditioning, computer data acquisition, engineering test design, and data analysis. Includes laboratory. Credit is not given for both ABE 425 and ME 360. Prerequisite: ECE 205.

426 Applied Machine Vision Credit: 3 hours.

The convergence of computer imaging, pattern recognition, and artificial intelligence have made it possible to quantify complex physical phenomena that commonly occur in food and agricultural systems. This course introduces students to basic principles required for machine vision applications. Hardware and software aspects for machine vision applications will be studied. Includes laboratory. Prerequisite: CS 101, MATH 225, or consent of instructor.

430 Project Management Credit: 2 hours.

Engineering team effectiveness; project definition; assessing related technologies; marketing and business planning related to engineering; budgeting and financial analyses of engineering projects; safety, ethics and environmental considerations; intellectual property; engineering proposal presentation. Same as TSM 430. Prerequisite: Senior or graduate standing, or consent of instructor.

440 Applied Statistical Methods I Credit: 4 hours.

Same as ANSC 440, CPSC 440, FSHN 440, and NRES 440. See CPSC 440.

445 Statistical Methods Credit: 4 hours.

Same as ANSC 445, and NRES 445. See ANSC 445.

456 Land and Water Resources Eng Credit: 3 or 4 hours.

Hydrology, hydraulics, design, construction and cost estimating of structures for the conservation and quality control of soil and water resources; relationship of topography, soils, crops, climate, and cultural practices in conservation and quality control of soil and water for agriculture. Includes laboratory. 3 undergraduate hours. 3 or 4 graduate hours. Prerequisite: Credit or concurrent registration in TAM 335.

459 Drainage and Water Management Credit: 0 to 4 hours.

Design, construction, performance, and maintenance of surface, subsurface, and open ditch agricultural drainage systems. Includes laboratory. 3 undergraduate hours. 3 or 4 graduate hours. Prerequisite: Credit or concurrent registration in TAM 335.

466 Engineering Off-Road Vehicles Credit: 3 hours.

Engineering aspects of design and application of off-road vehicles for farm and construction use; thermodynamics of engines; measurement of power and efficiencies; power transmission and traction; chassis mechanics; and operator environment. Includes laboratory. Prerequisite: ME 300 or equivalent.

469 Off-Road Industry Design Proj Credit: 3 hours.

Emphasizes open-ended design projects in the off-road equipment industry which utilize principles of machine design, engineering analysis and functional operation of engineering systems. Projects are submitted and sponsored by industrial clients, design team developed, concepts visualized, alternatives evaluated and geometry created using CAD systems. Emphases on communication skills, technical writing and interaction with industry representatives. Students operate in a team-based industrial environment with "real life" industrial projects. Prerequisite: ABE 361, TAM 335 or CHBE 421 or credit or concurrent registration in ME 370.

476 Indoor Air Quality Engineering Credit: 3 hours.

Principles and applications of indoor air quality. Topics include particle mechanics, gas kinetics, air quality sampling principles and techniques, air cleaning technologies (i.e. filters, cyclones, electrostatic precipitation) for indoor environments, and ventilation effectiveness. Includes laboratory. Prerequisite: PHYS 213, MATH 385, TAM 335 or equivalent.

479 Design of Agr & Bio Structures Credit: 3 hours.

Complete design of light frame building components including timber, concrete, beams and connectors. Design of heating and ventilation systems. Includes laboratory. Prerequisite: Senior standing or graduate student or consent of instructor.

482 Package Engineering Credit: 3 hours.

Same as FSHN 469. See FSHN 469.

483 Eng Properties of Food Mat Credit: 3 hours.

Physical properties of foods and biological materials; design of processing equipment and the sensing and control of food processes; thermal, electromagnetic radiation, rheological, and other mechanical properties. Includes laboratory. Prerequisite: Credit or concurrent registration in TAM 251 and CHBE 421; or TAM 251, TAM 335, and ME 300 or ME 320.

485 Food and Process Eng Design Credit: 2 hours.

Design of equipment, processes, and facilities for food, pharmaceutical, biotechnology, and related process industries. Prerequisite: ABE 483.

487 Grain Drying and Conditioning Credit: 3 hours.

Psychrometric principles of air modification for dehydration and conditioning of moist products, emphasizing the drying of cereal grains; industrial dryers; design of drying, cooling, and aeration systems. Includes laboratory. Prerequisite: ABE 222 or consent of instructor; ME 300 recommended.

488 Bioprocessing Grains for Fuels Credit: 3 hours.

Study of engineering and scientific principles involved in bioprocessing of cereal grains for production of ethanol and other fermentation products. Process unit operations, conventional and alternative feed stock materials, recovery of value-added coproducts and other variables involved in producing fuel ethanol will be discussed. Process simulation and economic analysis will also be addressed. Prerequisite: TAM 251 and CHBE 321; or consent of instructor.

489 Process Des for Corn Milling Credit: 3 hours.

Engineering and scientific principles involved in the major corn fractionation processes of wet milling, dry milling and alkali cooking, including structural and diffusional characteristics of corn, steeping phenomena and chemical and mechanical fractionation methods. Principles of process design and mill operation. Prerequisite: ME 300 or ME 320 or CHBE 421, or consent of instructor.

498 Special Topics Credit: 1 to 4 hours.

Group discussion or an experimental course on a special topic in agricultural engineering. May be repeated to a maximum of 16 hours.

501 Graduate Research I Credit: 1 hours.

Basic research orientation, research methods, presentation skills, laboratory practices, case studies, and professional and ethical conduct. Prerequisite: Graduate standing.

502 Graduate Research II Credit: 1 hours.

Research methodology, teaching methods, lecture preparation and delivery, critical review of scientific articles, peer review and publishing, mentoring and peer relationships, time management, and intellectual property. Prerequisite: Graduate standing.

561 Off-Road Vehicle Mechatronics Credit: 4 hours.

Emphasizes integrated skills in designing mechatronic systems with regard to off-road vehicles. Main topics include fundamentals for mechatronic systems design; modeling of off-road vehicle systems, on-vehicle information management, and intelligent vehicle controls. Prerequisite: ABE 425 or ME 461 or MFGE 430; ECE 486 or ME 460; or equivalent.

594 Graduate Seminar Credit: 0 hours.

Presentations of thesis research by graduate students; other presentations on teaching or current research issues related to agriculture, biology, and engineering. Approved for S/U grading only. May be repeated up to a maximum of 6 times. Prerequisite: Graduate standing.

597 *Independent Study* Credit: 1 to 4 hours.

Individual investigations or studies of any phases of agricultural engineering selected by the student and approved by the advisor and the faculty member who will supervise the study. May be repeated to a maximum of 16 hours. Prerequisite: Consent of instructor.

599 *Thesis Research* Credit: 0 to 16 hours.

May be repeated. Approved for S/U grading only.