AGRICULTURAL SYSTEMS TECHNOLOGY (AGST)

AGST 109 Physical Principles in Agriculture and Life Sciences
Prerequisites: MATH 101 or 102 or 103 or 104 or 106; or placement in MATH 102 or 104 or 106. Credit toward the degree may be earned in only one of: AGST 109, MSYM 109, PHYS 141, PHYS 141H, or PHYS 151.
Description: Fundamental principles of mechanics, heat, electricity, magnetism and electromagnetism and their relationship to energy utilization and conservation. Principles then applied to problem situations in agriculture and life sciences.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Grading Option: Graded with Option
Prerequisite for: AGST 109L; AGST 216; AGST 232; AGST 262; AGST 342; AGST 354, SOIL 354; AGST 362; AGST 452, AGST 852, PLAS 452; FDST 363, AGST 363
ACE: ACE 4 Science

AGST 109L Physical Principles in Agriculture and Life Sciences Laboratory
Prerequisites: AGST 109 or parallel, or PHYS 151
Description: Laboratory experiments on mechanics, heat, electricity, magnetism and electromagnetism and their relationship to energy utilization and conservation in agriculture and life sciences.
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 1
Grading Option: Graded with Option

AGST 162 Introduction to Agricultural Systems Technology
Description: Basic principles of describing and evaluating mechanized systems relevant to agriculture, food, energy, and water. Problem solving using systems-thinking. Exploration of major and career opportunities. Academic success and planning.
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 1
Grading Option: Graded with Option

AGST 216 Fundamentals of Electrical Systems
Prerequisites: AGST 109 or PHYS 141, or PHYS 151, or PHYS 211
Description: Basic theory of electrical circuits, utilization of electric energy in production, processing, and residential applications. Theory and application of direct current (DC) and alternating current (AC) principles, switch and outlet wiring, wiring installations, selection of safe and adequate circuit devices, service equipment sizing, conductor sizing, electric motor operation and their control are covered. Develop switch and relay circuit schematics and build both DC and AC functional circuits. Ladder logic diagrams will be studied to understand the basic controls implemented in industrial automation.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option
Offered: SPRING
Prerequisite for: AGST 412; AGST 416

AGST 232 Power and Machinery Principles
Prerequisites: AGST 109, or PHYS 141, or PHYS 151, or PHYS 211, or parallel PHYS 211
Description: Operational characteristics of IC engines, field, materials-handling, and processing machines and their components. Includes analyses, estimations, and objective comparisons of performance; principles for adjustment and calibration of metering systems; and cost-effective sizing of machines. Exercises include using ASABE Standards and available reports of machine performance (tractor test reports, etc.).
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option
Offered: FALL

AGST 262 Techno-Economic Project Management
Prerequisites: AGST 109 or PHYS 141 or PHYS 151 or PHYS 211.
Notes: Open to AGST majors only.
Description: Professional communication of technical information. Strategies for effective teamwork to plan and execute technical projects. Fundamentals of project planning in a team-based context. Introduction to quantitative techno-economic analysis to support decision-making related to agricultural systems technology. Professional ethics in context of project management.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option
Offered: SPRING

AGST 299 Career Experiences
Prerequisites: Permission and advanced approval of plan or work.
Description: Student participation in physical systems applications. May include participation in mechanization-related areas of agribusiness, production practices, and processing operations; research in laboratory, greenhouse and field; or preparation of teaching materials.
Credit Hours: 1-5
Min credits per semester: 1
Max credits per semester: 5
Max credits per degree: 12
Grading Option: Pass No Pass

AGST 316 Technologies and Techniques in Digital Agriculture
Prerequisites: Junior Standing
Notes: Class meets once a week with the lecture and lab being taught concurrently to foster hands-on learning.
Description: Overview of the digital agriculture technologies and techniques to support crop and livestock production systems. Emphasis on data life cycle including generation, collection, storage, processing, visualization, and analysis. Hands-on experiences with agricultural IoT, sensing, data processing, and decision making with open-source programming tools,
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option
Offered: SPRING

AGST 342 Animal Housing Systems
Prerequisites: AGST 109 or PHYS 141 or PHYS 151 or PHYS 211
Description: Production facilities for livestock and poultry will be developed with emphasis on building and feedlot layout, ventilation, heating and cooling systems; energy utilization; and construction materials and methods.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option
Offered: FALL

AGST 354 Soil Conservation and Watershed Management
Crosslisted with: SOIL 354
Prerequisites: PLAS/SOIL 153; and AGST 109 or PHYS 141 or PHYS 151 or PHYS 211
Description: Watershed hydrology, soil erosion, erosion control, water management, and land surveying and mapping. Includes rainfall-runoff relationships; determination of watershed characteristics; terraces, waterways, vegetative filters, and residue management; ponds, wetlands, non-point source pollution control, and water conservation; profile and topographic surveying.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option
Offered: FALL

AGST 362 Agricultural Products Processing and Handling
Prerequisites: AGST 109 or PHYS 141 or PHYS 151 or PHYS 211
Description: Analysis of processing and handling operations. Chemical and physical characteristics of agricultural products. Application of pyschrometrics. Power requirements, capacities, and efficiencies of drying and conveying systems. Discussion of safety issues, logistics, and survey of industry technologies.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option
Offered: SPRING

AGST 363 Heat and Mass Transfer
Crosslisted with: FDST 363
Prerequisites: MATH 104 or 106; AGST 109 or PHYS 141 or 151.
Description: Fundamentals of food engineering including material and energy balances, fluid mechanics, heat transfer and mass transfer.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option

AGST 367 Pet Food Manufacturing
Crosslisted with: FDST 367
Prerequisites: CHEM 106A and 106L or CHEM 110A and 110L
Notes: Field trips are required and may occur outside of scheduled class time.
Description: The companion animal industry, products, processes and career opportunities.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded
Offered: FALL

AGST 395 Internship in Agricultural Systems Technology
Prerequisites: By permission
Notes: Completion of internship approval form is required. The internship proposal is subject to approval by the Department of Biological Systems Engineering. Pass/No Pass only.
Description: Practical experience, directed learning, and career exploration and development in a selected business, industry, agency, or educational institution.
Credit Hours: 1-3
Min credits per semester: 1
Max credits per semester: 3
Max credits per degree: 5
Grading Option: Pass No Pass
Experiential Learning: Internship/Co-op

AGST 400A Occupational Safety
Prerequisites: Junior standing
Notes: Online course offered by Iowa State University through the AG*IDEA consortium. Contact CASNR Distance Education Consortium Coordinator for course details, prerequisites and registration information.
Description: Identifies safety and health risks in industrial work environments. Focus on how managers and supervisors meet their responsibilities for providing a safe workplace for their employees. Includes the identification and remediation of workplace hazards.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded

AGST 400E Biorenewable Systems Technology
Notes: Online course offered by Iowa State University through the AG*IDEA consortium. Contact CASNR Distance Education Consortium Coordinator for course details, prerequisites and registration information.
Description: The science, engineering, economics and business of converting biorenewable resources into bioenergy and biobased products. Biorenewable concepts as they relate to drivers of change, feedstock production, economics, transportation and logistics, and marketing.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded

AGST 400K Chemical Application Systems
Notes: Online course offered by Kansas State University through the AG*IDEA consortium. Contact CASNR Distance Education Consortium Coordinator for course details, prerequisites and registration information.
Description: Systems, components, operation practices, and safety procedures used in the chemical application industry. Liquid and granular application systems and respective components will be studied along with procedures for equipment sizing and maintenance, minimizing drift, system calibration, and safe handling-transportation-storage-disposal and spill clean-up of agrichemicals.
Credit Hours: 2
Max credits per semester: 2
Max credits per degree: 2
Grading Option: Graded

AGST 412 Hydraulic Power Systems
Prerequisites: AGST 216
Description: Theory and application of fluids under controlled pressure to perform work in mobile and industrial applications. Positive displacement (PD) pumps, linear and rotary hydraulic actuators (hydraulic cylinders and motors), valves, and electric over hydraulic systems will be studied in detail. Fluid power circuit development on both hydraulic benches and computer simulated environments will be performed with emphasis on circuit analysis, and system troubleshooting.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option
Offered: SPRING

AGST 416 Sensors and Control Systems for Agri-Industries
Prerequisites: AGST 216
Description: Application of sensors for measurement of process control variables and implementation of microcomputer-based measurement and control systems. Basic electrical and electronic instrumentation plus control of electrically, pneumatically and/or hydraulically powered systems.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option

AGST 431 Site-specific Crop Management
Crosslisted with: AGEN 431, PLAS 431
Prerequisites: Senior standing; PLAS/SOIL 153; PLAS 204.
Description: Principles and concepts of site-specific management. Evaluation of geographic information systems for crop production practices. Practical experience with hardware and software necessary for successful application of information affecting crop management.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option

AGST 433 Equipment and Tractor Testing
Crosslisted with: AGST 833
Prerequisites: AGST 232; and STAT 218 or STAT 380 or MECH 321
Notes: Offered spring semester in even-numbered calendar years.
Description: Principles and procedures involved in testing agricultural equipment and tractors. Actual test planned, scheduled, conducted and reported. Test may be based upon procedures used at the Nebraska Tractor Testing Laboratory or involve other equipment being used for research in the department.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option
Offered: SPRING

AGST 436 Embedded Controls for Agricultural Applications
Crosslisted with: AGEN 436, AGEN 836, AGST 836
Prerequisites: AGEN/BSEN 260 or AGST 416
Description: Introduction to the basics of embedded controller programming, and the development of Controller Area Network (CAN) bus systems in agricultural applications. Interfacing sensors with analog and digital signals, closed loop control of actuators, transmission and reception of CAN messages, programming of CAN messages in a distributed controller set up for sensor data acquisition, and actuator control will be studied.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded
Offered: FALL

AGST 452 Irrigation Systems Management
Crosslisted with: AGST 852, PLAS 452
Prerequisites: AGST 109 or PHYS 141 or PHYS 151 or PHYS 211
Notes: PLAS/SOIL 153 recommended.
Description: Irrigation management and the selection, evaluation, and improvement of irrigation systems. Includes soil-water measurement, crop water use, irrigation scheduling, irrigation efficiency, measurement of water flow, irrigation systems, groundwater and wells, pumping systems, applying chemicals with irrigation systems, and environmental and water resource considerations.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option
Offered: FALL
Prerequisite for: AGEN 854, AGST 854; AGST 855

AGST 462 Managing Technology in Agricultural Systems
Crosslisted with: AGST 862
Prerequisites: Senior standing in AGST
Notes: Capstone course.
Description: Team-based activities to evaluate integration of technology into, and utilization of resources for, agricultural systems; perform technical and economic evaluations; make technical and economic recommendations; and develop professional written and oral reports. Topics include technology system performance and management, project scheduling and planning, cost estimation, reliability analysis, and risk assessment.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option
Offered: SPRING
ACE: ACE 10 Integrated Product
Experiential Learning: Case/Project-Based Learning

AGST 465 Food Engineering Unit Operations
Crosslisted with: FDST 465, FDST 865, AGST 865
Prerequisites: FDST/AGST 363.
Description: Unit operations and their applications to food processing.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option

AGST 469 Bio-Atmospheric Instrumentation
Crosslisted with: GEOG 469, PLAS 407, METR 469, NRES 469, AGRO 869, GEOG 869, HORT 807, METR 869, AGST 869, NRES 869
Prerequisites: Junior standing; MATH 106; 4 hrs physics; physical or biological science major.
Description: Discussion and practical application of principles and practices of measuring meteorological and related variables near the earth's surface including temperature, humidity, precipitation, pressure, radiation and wind. Performance characteristics of sensors and modern data collection methods are discussed and evaluated.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option

AGST 475 Water Quality Strategy
Crosslisted with: NRES 475, NRES 875, SOIL 475, PLAS 475, AGRO 875, CIVE 475, CIVE 875, CRPL 475, CRPL 875, GEOL 475, GEOL 875, AGST 875
Prerequisites: Senior undergraduate or graduate student status.
Notes: Capstone course.
Description: Introduces methods to identify, analyze, strategize, justify and develop planning approaches to protect water quality from nonpoint source contamination. Focuses on identifying present water quality issues and situations, investigating adverse impacts on whole systems and subsystems over time, developing effective planning strategies, and assessing strategy effectiveness.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option
Offered: SPRING
ACE: ACE 10 Integrated Product

AGST 492 Special Topics in Agricultural Systems Technology
Crosslisted with: AGST 892
Prerequisites: Permission
Description: Subject matter in emerging areas of Mechanized Systems Management not covered in other courses within the curriculum. Topics, activities, and delivery methods vary.
Credit Hours: 1-6
Min credits per semester: 1
Max credits per semester: 6
Max credits per degree: 6
Grading Option: Graded with Option

AGST 496 Principles and Problems in Mechanized Agriculture
Crosslisted with: AGST 896
Prerequisites: 15 hours in AGST or closely related area.
Description: Individual or group projects in research, literature review, or extension of course work under the supervision and evaluation of a departmental faculty member.
Credit Hours: 1-5
Min credits per semester: 1
Max credits per semester: 5
Max credits per degree: 12
Grading Option: Graded with Option

AGST 499H Honors Thesis
Prerequisites: Admission to the University Honors Program and permission
Notes: AGRI 299H recommended.
Description: Conduct a scholarly research project and write a University Honors Program or undergraduate thesis.
Credit Hours: 3-6
Min credits per semester: 3
Max credits per semester: 6
Max credits per degree: 6
Grading Option: Graded