MECHANIZED SYSTEMS MANAGEMENT (MSYM)

MSYM 109 Physical Principles in Agriculture and Life Sciences
Crosslisted with: MSYM 109H
Prerequisites: MATH 101 or 103 with a grade of C or better completed within the last 11 months; or, placement in MATH 102 or 104 (or higher) within the last 11 months
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. Students cannot receive credit for both MSYM 109 and any one of the following: PHYS 141, 151 or 211.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Format: LEC
Prerequisite for: MSYM 109L; MSYM 232; MSYM 262; MSYM 452, MSYM 852, WATS 452, AGRO 452
ACE: ACE 4 Science

MSYM 109H Physical Principles in Agriculture and Life Sciences
Crosslisted with: MSYM 109
Prerequisites: MATH 101 or 103 with a grade of C or better completed within the last 11 months; or, placement in MATH 102 or 104 (or higher) within the last 11 months
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. Students cannot receive credit for both MSYM 109 and any one of the following: PHYS 141, 151 or 211.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Format: LEC
Prerequisite for: MSYM 109L; MSYM 232; MSYM 262; MSYM 452, MSYM 852, WATS 452, AGRO 452
ACE: ACE 4 Science

MSYM 109L Physical Principles in Agriculture and Life Sciences
Laboratory
Prerequisites: MSYM 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
Format: LAB

MSYM 162 Introduction to Mechanized Systems Management
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
Format: LEC

MSYM 232 Power and Machinery Principles
Prerequisites: MSYM 109 or PHYS 141 or PHYS 151 or 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
Format: LEC

MSYM 245 Electrical Service Systems
Crosslisted with: MSYM 245H
Description: Utilization of electric energy in agricultural production, processing, and residential applications. Wiring installations; selection of safe and adequate circuit devices; service equipment and conductors; and electric motors and their control; and energy management.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

MSYM 245H Electrical Service Systems
Crosslisted with: MSYM 245
Description: Utilization of electric energy in agricultural production, processing, and residential applications. Wiring installations; selection of safe and adequate circuit devices; service equipment and conductors; and electric motors and their control; and energy management.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

MSYM 262 Problem Solving in Mechanized Systems Management
Prerequisites: MSYM 109 or PHYS 141 or PHYS 151 or PHYS 211.
Notes: Open to MSYM majors only.
Description: Use of computational tools to solve problems relevant to mechanized systems management. Professional communication of technical information. Discussion of current and emerging issues relevant to the major.
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 1
Format: LEC
Offered: SPRING

MSYM 299 Career Experiences
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
Format: IND
MSYM 312 Engine Power Systems  
Crosslisted with: MSYM 312H  
Description: Internal combustion engine power systems used in agriculture with primary emphasis on power needs for both mobile and fixed operations, characteristics of power sources and energy resources, and selection and use of power units.  
Credit Hours: 3  
Max credits per semester: 3  
Max credits per degree: 3  
Format: LEC  

MSYM 312H Engine Power Systems  
Crosslisted with: MSYM 312  
Description: Internal combustion engine power systems used in agriculture with primary emphasis on power needs for both mobile and fixed operations, characteristics of power sources and energy resources, and selection and use of power units.  
Credit Hours: 3  
Max credits per semester: 3  
Max credits per degree: 3  
Format: LEC  

MSYM 342 Animal Housing Systems  
Prerequisites: MSYM 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  
Format: LEC  
Offered: FALL  

MSYM 354 Animal Housing Systems  
Prerequisites: AGRO/SOIL 153; and MSYM 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  
Format: LEC  

MSYM 354 Soil Conservation and Watershed Management  
Prerequisites: SOIL 354, WATS 354  
Prerequisites: AGRO/SOIL 153; and MSYM 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  
Format: LEC  
Offered: FALL  

MSYM 363 Heat and Mass Transfer  
Crosslisted with: FDST 363  
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  
Format: LEC  

MSYM 364 Agricultural Products Processing and Handling  
Prerequisites: MSYM 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 psychrometrics. 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  
Format: LEC  

MSYM 395 Internship in Mechanized Systems Management  
Offered: SPRING  
Description: Practical experience, directed learning, and career exploration and development in a selected business, industry, agency, or educational institution. Completion of internship approval form is required. The internship proposal is subject to approval by the Department of Biological Systems Engineering.  
Credit Hours: 1-3  
Min credits per semester: 1  
Max credits per semester: 3  
Max credits per degree: 5  
Format: FLD  

MSYM 400A Occupational Safety  
Prerequisites: Junior standing  
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. 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.  
Credit Hours: 3  
Max credits per semester: 3  
Max credits per degree: 3  
Format: LEC  

MSYM 400B Agricultural Safety and Health  
Prerequisites: MSYM 400A  
Description: Safety concepts, principles, practices, rules and regulations as they relate to agriculture will be explored. Developing and conducting safety programs, and conducting safety inspections and accident investigations are other aspects of the course. Online course offered by University of Missouri through the AG*IDEA consortium. Contact CASNR Distance Education Consortium Coordinator for course details, prerequisites and registration information.  
Credit Hours: 3  
Max credits per semester: 3  
Max credits per degree: 3  
Format: LEC  

MSYM 400E Biorenewable Systems Technology  
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. 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.  
Credit Hours: 3  
Max credits per semester: 3  
Max credits per degree: 3  
Format: LEC
MSYM 400J Machinery Management Using Precision Agriculture Technology
Prerequisites: Junior standing or instructor permission
Description: Management of agricultural equipment that is commonly used in conjunction with GPS technology such as planters, combines, fertilizer application equipment, and sprayer application equipment. Online course offered by University of Missouri through the AG*IDEA consortium. Contact CASNR Distance Education Consortium Coordinator for course details, prerequisites and registration information.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

MSYM 400K Chemical Application Systems
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 agichemicals. 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.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

MSYM 412 Hydraulic Power Systems
Crosslisted with: MSYM 812
Prerequisites: MSYM 245
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
Format: LEC
Offered: SPRING

MSYM 416 Sensors and Control Systems for Agri-Industries
Crosslisted with: MSYM 816
Prerequisites: MSYM 245 or permission.
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
Format: LEC

MSYM 431 Site-specific Crop Management
Crosslisted with: AGEN 431, AGRO 431
Prerequisites: Senior standing; AGRO/SOIL 153; AGRO 204; or permission.
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
Format: LEC

MSYM 433 Equipment and Tractor Testing
Crosslisted with: MSYM 833
Prerequisites: MSYM 232; and STAT 218 or STAT/MATH 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
Format: LEC
Offered: SPRING

MSYM 452 Irrigation Systems Management
Crosslisted with: MSYM 852, WATS 452, AGRO 452
Prerequisites: MSYM 109 or PHYS 141 or PHYS 151 or PHYS 211
Notes: AGRO/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
Format: LEC
Offered: FALL

MSYM 462 Equipment Systems
Crosslisted with: MSYM 862
Prerequisites: Senior standing in MYSM or permission
Description: Team-based activities to evaluate equipment systems, make technical and economic recommendations, develop professional written and oral reports. Topics include equipment system performance and management, project scheduling and planning, cost estimation, reliability analysis, and risk assessment. Capstone course.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
ACE: ACE 10 Integrated Product
MSYM 465 Food Engineering Unit Operations  
Crosslisted with: FDST 465, FDST 865, MSYM 865  
Description: Unit operations and their applications to food processing.  
Credit Hours: 3  
Max credits per semester: 3  
Max credits per degree: 3  
Format: LEC

MSYM 469 Bio-Atmospheric Instrumentation  
Crosslisted with: AGRO 469, GEOG 469, HORT 407, METR 469, NRES 469  
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  
Format: LEC  
Groups: Physical Geography

MSYM 475 Water Quality Strategy  
Crosslisted with: NRES 475, NRES 875, SOCI 475, SOCI 875, SOIL 475, WATS 475, AGRO 475, AGRO 875, CIVE 475, CIVE 875, CRPL 475, CRPL 875, GEOL 475, GEOL 875, MSYM 875, POLS 475, POLS 875  
Prerequisites: Senior standing or permission  
Description: Holistic approach to the selection and analysis of planning strategies for protecting water quality from non-point sources of contamination. Introduction to the use of methods of analyzing the impact of strategies on whole systems and subsystems; for selecting strategies; and for evaluating present strategies. Capstone course.  
Credit Hours: 3  
Max credits per semester: 3  
Max credits per degree: 3  
Format: LEC  
ACE: ACE 10 Integrated Product  
Groups: American Government&Public Pol

MSYM 492 Special Topics in Mechanized Systems Management  
Crosslisted with: MSYM 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  
Format: LEC

MSYM 496 Principles and Problems in Mechanized Agriculture  
Crosslisted with: MSYM 896  
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  
Format: IND

MSYM 499H Honors Thesis  
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  
Format: IND