MECHANIZED SYSTEMS MANAGEMENT (MSYM)

MSYM 812 Hydraulic Power Systems
Prerequisites: MSYM 245 and 312
Description: Theory and application of fluids under controlled pressure to perform work in mobile and industrial applications. Operation of components and functional planning of circuits with emphasis on troubleshooting and analysis.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

MSYM 816 Sensors and Control Systems for Agri-Industries
Prerequisites: MSYM 245
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 832 Mechanized Agricultural Systems
Prerequisites: Permission
Notes: Offered odd-numbered calendar years.
Description: Advanced concepts of equipment used in agriculture. Site specific management (precision agriculture). Hardware development and information technologies applied to generic agricultural production.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

MSYM 833 Equipment and Tractor Testing
Crosslisted with: MSYM 433
Prerequisites: MSYM 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
Format: LEC
Offered: SPRING

MSYM 836 Embedded Controls for Agricultural Applications
Crosslisted with: AGEN 436, MSYM 436, AGEN 836
Prerequisites: AGEN/BSEN 260 or MSYM 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
Format: LEC
Offered: FALL

MSYM 852 Irrigation Systems Management
Crosslisted with: MSYM 452, 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
Prerequisite for: AGEN 854, MSYM 854; AGEN 955, AGRO 955, CIVE 955, GEOL 985; MSYM 855

MSYM 854 Irrigation Laboratory and Field Course
Crosslisted with: AGEN 854
Prerequisites: AGEN 453/853, or MSYM 452/852
Notes: Offered during the summer pre-session in even calendar years.
Description: A laboratory and field course which emphasizes irrigation water supply and distribution systems. Laboratory topics include performance of surface, sprinkler, and drip irrigation systems; pipeline hydraulics; flow in streams, canals, and irrigation pipelines; irrigation pumping systems; irrigation well hydraulics; and soil water properties. The field trip includes visits to irrigation water supply and hydroelectric power projects; water resources agencies; irrigation field research sites; and manufacturers and installers of agricultural irrigation systems.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: FLD
Offered: SUMMER
Prerequisite for: AGEN 954
MSYM 855 Advanced Irrigation Management  
**Prerequisites:** MSYM 852 or equivalent  
**Notes:** AGRO 861 recommended  
**Description:** Theory and practice in on-farm irrigation management including irrigation response functions and irrigation uniformity concepts; field evaluation of surface and sprinkler irrigation systems; estimation of evapotranspiration and irrigation scheduling; water quality problems and salinity control.  
**Credit Hours:** 3  
**Max credits per semester:** 3  
**Max credits per degree:** 3  
**Format:** LEC

MSYM 862 Equipment Systems  
**Crosslisted with:** MSYM 462  
**Prerequisites:** Senior standing in MSYM  
**Notes:** Capstone course.  
**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.  
**Credit Hours:** 3  
**Max credits per semester:** 3  
**Max credits per degree:** 3  
**Format:** LEC

MSYM 865 Food Engineering Unit Operations  
**Crosslisted with:** FDST 465, FDST 865, MSYM 465  
**Prerequisites:** FDST/MSYM 363.  
**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 869 Bio-Atmospheric Instrumentation  
**Crosslisted with:** AGRO 469, GEOG 469, HORT 407, METR 469, MSYM 469, NRES 469, AGRO 869, GEOG 869, HORT 807, METR 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  
**Format:** LEC  
**Groups:** Physical Geography

MSYM 875 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 475, POLS 475, POLS 875  
**Prerequisites:** Senior standing.  
**Notes:** Capstone course.  
**Description:** Holistic approach to the selection and analysis of planning strategies for protecting water quality from nonpoint 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.  
**Credit Hours:** 3  
**Max credits per semester:** 3  
**Max credits per degree:** 3  
**Format:** LEC

MSYM 892 Special Topics in Mechanized Systems Management  
**Crosslisted with:** MSYM 492  
**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 896 Principles and Problems in Mechanized Agriculture  
**Crosslisted with:** MSYM 496  
**Prerequisites:** 15 hours in MSYM 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  
**Format:** IND

MSYM 897 Masters Project  
**Crosslisted with:** AGEN 897, BSEN 897  
**Prerequisites:** Admission to M.S. in Agricultural and Biological Systems Engineering or M.S. in Mechanized Systems Management, and permission of major advisor  
**Notes:** Intended for students who are pursuing an Option II or III master's degree in Agricultural and Biological Systems Engineering, or Mechanized Systems Management.  
**Description:** Conception, design, development, and completion of a project that requires data collection, synthesis, analysis of results, and the development of a final written report that will be defended in the final oral examination.  
**Credit Hours:** 3-6  
**Min credits per semester:** 3  
**Max credits per semester:** 6  
**Max credits per degree:** 6  
**Format:** IND
MSYM 898 Special Projects in Management of Mechanized Systems

Prerequisites: 15 hours in mechanized systems management or closely related area

Description: Individual project specifically designed for a student to pursue or explore a special topic under the guidance and evaluation of a faculty member.

Credit Hours: 1-5
Min credits per semester: 1
Max credits per semester: 5
Max credits per degree: 5
Format: IND

MSYM 899 Masters Thesis

Prerequisites: Admission to masters degree program and permission of major adviser

Credit Hours: 1-10
Min credits per semester: 1
Max credits per semester: 10
Max credits per degree: 99
Format: IND