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

**Grading Option:** Grade Pass/No Pass Option

**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

**Grading Option:** Grade Pass/No Pass Option

**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

**Grading Option:** Grade Pass/No Pass Option

**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

**Grading Option:** Grade Pass/No Pass Option

**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

**Grading Option:** Graded

**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

**Grading Option:** Grade Pass/No Pass Option

**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

**Grading Option:** Graded

**Offered:** SUMMER
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
Grading Option: Grade Pass/No Pass Option

MSYM 862 Equipment Systems
Crosslisted with: MSYM 462
Prerequisites: Senior standing in MYSM
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
Grading Option: Grade Pass/No Pass Option

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
Grading Option: Grade Pass/No Pass Option

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
Grading Option: Grade Pass/No Pass Option

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
Grading Option: Grade Pass/No Pass Option

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
Grading Option: Grade Pass/No Pass Option

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
Grading Option: Grade Pass/No Pass Option

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
Grading Option: Pass No-Pass
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
Grading Option: Grade Pass/No Pass Option

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
Grading Option: Pass No-Pass