

AGRICULTURAL SYSTEMS MANAGEMENT (ASM)

ASM 309: Measurement & Monitoring of Hydrologic Systems

3 Credits

Introduction to measurement and monitoring equipment/techniques commonly used in analyses and design of hydrologic systems. ASM 309 / ERM 309 Measurement & Monitoring of Hydrologic Systems (3) This course will provide students the opportunity to learn and apply basic measurement techniques that serve as critical tools in professional practice in water resources. Mapping development and use serves as a critical aspect of water resources engineering and planning, and a major portion of this course will focus on the fundamentals of surveying and translation of surveyed data into useful maps and engineering drawings. Students will learn the theory that underpins basic surveying and then apply this theory in actual survey practice. Autocad serves as a primary software tool used in engineering design and water resources planning, and students will be afforded opportunities to use Autocad to present and process various watershed- and survey-based data. Geographic information system (GIS) techniques will also be investigated as a tool to process, record, analyze, and display various spatial data commonly used in water resources planning and engineering design. Students will learn the basic techniques and processes used to transfer data between GIS and Autocad, both of which are commonly used in practice. The course will also investigate the instrumentation, techniques, and theory involved in common water resources measurements including weather conditions (which serve as the principle driving conditions in water resources), flow monitoring, basic soil properties, water movement in soils, and water quality sampling and analyses. Students will conduct hands-on exercises that will focus on the use of various instruments and techniques commonly employed to conduct such measurements. Data collected will be processed and analyzed within the context of professional practice case studies. The various aspects of the course will coalesce around the concept of the watershed being the basic unit of water resources analyses and design, and students will experience how various measurement techniques and approaches are necessary tools for practicing professionals. This course will be useful to any undergraduates seeking degrees in a major related to water resources planning, engineering, or technology.

Prerequisite: PHYS 211 or PHYS 250 , CHEM 110
Cross-listed with: ERM 309

ASM 309H: Measurement & Monitoring of Hydrologic Systems

3 Credits

Introduction to measurement and monitoring equipment/techniques commonly used in analyses and design of hydrologic systems.

Cross-Listed

ASM 310: Power Transmission in Agriculture

3 Credits

Selection and maintenance of mechanical, hydraulic, and pneumatic power transmission components and systems. Electric motor principles and controls. ASM 310 Power Transmission in Agriculture (3) After successful completion of ASM 310, students will apply the physical

principles, of mechanical power transmission system components such as shafts, belts and sheaves, chains and sprockets, gears, torque limiters, clutches, and universal joints by selecting suitable mechanical drives and specifying proper maintenance procedures. Students will be able to read hydraulic and pneumatic schematics, size fluid power components such as pumps, lines, valves, cylinders, and troubleshoot hydraulic and pneumatic systems. Students will also be able to explain the electrical and physical principles of AC and DC electric motor operation. They will be able to identify torque, speed, voltage, and current operating characteristics and will be able to select controls and circuit protection devices necessary to achieve proper performance. As a required course in the Agricultural Systems Management major, ASM 310 is a prerequisite for other courses.

Prerequisite: Prerequisite or concurrent: BRS 221

ASM 320: Combustion Engines for Mobile Equipment

3 Credits

After successful completion of ASM 320, students will explain and evaluate the theoretical and practical aspects of internal combustion engines. Students will evaluate and compare alternative engine thermodynamic cycles, alternative fuels (gasoline, diesel, biodiesel, compressed natural gas), performance enhancing attachments (turbochargers, intercoolers), and supporting systems (fuel injection, lubrication, starting, cooling, emissions cleansing). Students will be able to properly select engines and related systems for mobile applications. Students will employ important maintenance procedures required for economical useful life and proper operation. Students will be able to troubleshoot engine systems.

Prerequisite: ASM 310; BE 306; ME 360

ASM 327: Soil and Water Resource Management

3 Credits

Soil and water management systems and practices including hydrology, surface drainage, open channels, and erosion, subsurface drainage, impoundments and irrigation.

Prerequisite: PHYS 250

ASM 327H: Soil and Water Resource Management

3 Credits

Soil and water management systems and practices including hydrology, surface drainage, open channels, and erosion, subsurface drainage, impoundments and irrigation.

Honors

ASM 420: Principles of Off-Road Machines

3 Credits

ASM 420 covers the technical aspects of off-road power machinery, such as tractors, self-propelled harvesters, and military, logging and construction equipment. Upon successful completion, students will understand the many facets of design and management of such vehicles (such as mechanical power generation, power allocation, power transmission, traction, operator enclosures, and electrical and electronic systems). Laboratory exercises will involve full-scale equipment with instrumentation used to measure performance. While ASM 420 is not

a prerequisite for any other course, it complements engineering and technology courses related to machinery. This course is a technical selection in the Biological Engineering and BioRenewable Systems majors and is required for the Off-Road Equipment minor. It complements other courses for anyone interested in the off-road machinery industries. ASM 420 covers several aspects of function and design related to off-road machinery.

Prerequisite: BE 306; ASM 310; ME 360

ASM 424: Selection and Management of Agricultural Machinery

3 Credits

ASM 424 covers the many aspects of mobile agricultural machinery, precision agriculture, and fleet management. Integration of economic analysis and functional performance topics are the focus. Types of agricultural machinery available, optimization, precision agriculture technology, machine sizing criteria and cycle diagrams, repair and maintenance, and reliability of machinery are major topics covered. Global positioning and geographic information systems hardware and software will be used to demonstrate the use of these technologies within precision agriculture from planting through harvest. Laboratory exercises will involve full-scale equipment with instrumentation used to measure performance. While ASM 424 is not a prerequisite for any other course, it complements engineering and technology courses related to machinery and provides precision agriculture familiarity. It complements other courses for anyone interested in the off-road machinery industries.

Prerequisite: BE 306; ASM 310; ME 360

ASM 424H: Selection and Management of Agricultural Machinery

3 Credits

Function and operation of field and farmstead machines; energy, quality, and loss considerations; selection and utilization; precision agriculture technology. A S M 424 Selection and Management of Agricultural Machinery (3) A S M 424 covers the many aspects of mobile agricultural machinery and fleet management. Integration of economic analysis and functional performance topics are the focus. Optimization, sizing criteria and cycle diagrams, repair and maintenance, reliability of machinery, and precision agriculture technology are major topics covered. Students will give demonstrations of machines as part of the course. Software will be used to select proper sets and sizes of machinery as well as predict impact of machinery selections that may be non-optimal. Grading will be based on homework, laboratory exercises, a demonstration project as well as mid-term and final examinations. Laboratory exercises will involve full-scale equipment with instrumentation used to measure performance. While A S M 424 is not a prerequisite for any other course, it complements engineering and technology courses related to machinery. This course serves as a technical selection in the Agricultural and Biological Engineering major or as an agricultural selection in the Agricultural Systems Management major. It complements other courses for anyone interested in the off-road machinery industries. A S M 424 covers several aspects of selection and management of agricultural production and processing machinery.

ASM 496: Independent Studies

1-18 Credits/Maximum of 18

Creative projects, including research and design, which are supervised on an individual basis and which fall outside the scope of formal courses.