

# AGRICULTURAL ENGINEERING (AGEN)

## AGEN 824 Machine Design in Agricultural Engineering

**Crosslisted with:** AGEN 424

**Prerequisites:** Senior standing; AGEN 324; and MECH 130

**Description:** Design of machine elements. Definition, analysis, and solution of a design problem in agricultural engineering.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

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

**Offered:** FALL

## AGEN 836 Embedded Controls for Agricultural Applications

**Crosslisted with:** AGEN 436, AGST 436, 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

## AGEN 841 Animal Waste Management

**Crosslisted with:** AGEN 441, BSEN 441, BSEN 841

**Prerequisites:** Senior standing.

**Description:** Characterization of wastes from animal production. Specification and design of collection, transport, storage, treatment, and land application systems. Air and water pollution, regulatory and management aspects.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

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

## AGEN 846 Unit Operations of Biological Processing

**Crosslisted with:** BSEN 446, BSEN 846, AGEN 446

**Prerequisites:** AGEN/BSEN 225; and AGEN/BSEN 344

**Description:** Application of heat, mass, and moment transport in analysis and design of unit operations for biological and agricultural materials. Evaporation, drying, distillation, extraction, leaching, thermal processing, membrane separation, centrifugation, and filtration.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

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

**Offered:** SPRING

**Prerequisite for:** BSEN 935

## AGEN 853 Irrigation and Drainage Systems Engineering

**Crosslisted with:** AGEN 453, BSEN 453, BSEN 853

**Prerequisites:** CIVE 310 or MECH 310; AGEN 344 or BSEN 344.

**Description:** Analytical and design consideration of evapotranspiration, soil moisture, and water movement as related to irrigation and drainage systems; analysis and design of components of irrigation and drainage systems including water supplies, pumping plants, sprinkler systems, and center pivots.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

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

**Prerequisite for:** AGEN 854, AGST 854; AGEN 953; AGST 855

## AGEN 854 Irrigation Laboratory and Field Course

**Crosslisted with:** AGST 854

**Prerequisites:** AGEN 453/853, or AGST 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

## AGEN 856 GIS and Ecohydrological Modeling for Natural Resources

**Crosslisted with:** BSEN 456, AGEN 456, BSEN 856

**Prerequisites:** AGEN/BSEN 350 or CIVE 352 or AGST/WATS 354 or NRES 453

**Description:** Use of GIS to create inputs to models such as HEC-HMS and SWAT. Processes to simulate hydrology and erosion in models. Development and calibration of models based on student's area of interest.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

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

**Offered:** SPRING

## AGEN 860 Instrumentation and Controls

**Crosslisted with:** AGEN 460, BSEN 460, BSEN 860

**Prerequisites:** ECEN 211 or ECEN 215 or AGEN/BSEN 260

**Description:** Analysis and design of instrumentation and controls for agricultural, biological, and biomedical applications. Theory of basic sensors and transducers, analog and digital electrical control circuits, and the interfacing of computers with instruments and controls. LabVIEW Programming. Emphasis on signal analysis and interpretation for improving system performance.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

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

**Offered:** FALL

**AGEN 889 Seminar I**

**Crosslisted with:** BSEN 889

**Description:** Introduction into departmental and campus resources, professionalism, preparation and delivery of presentations, technical writing, and additional topics as arranged by enrolled students.

**Credit Hours:** 1

**Max credits per semester:** 1

**Max credits per degree:** 1

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

**AGEN 892 Special Topics in Agricultural Engineering**

**Crosslisted with:** AGEN 492

**Prerequisites:** Permission

**Description:** Subject matter in emerging areas of Agricultural Engineering 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

**AGEN 896 Special Problems**

**Crosslisted with:** BSEN 896

**Prerequisites:** Permission

**Description:** Investigation and written report on engineering problems not covered in sufficient depth through existing courses. Topic varies by semester.

**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

**AGEN 897 Masters Project**

**Crosslisted with:** BSEN 897, AGST 897

**Prerequisites:** Admission to M.S. in Agricultural and Biological Systems Engineering or M.S. in Agricultural Systems Technology or M.S. in Mechanized Systems Management, and permission of major advisor

**Notes:** Intended for students who are pursuing an option B master's degree in Agricultural and Biological Systems Engineering, or Agricultural Systems Technology 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:** 1-6

**Min credits per semester:** 1

**Max credits per semester:** 6

**Max credits per degree:** 6

**Grading Option:** Pass No-Pass

**AGEN 898 Internship**

**Crosslisted with:** BSEN 898

**Prerequisites:** Permission

**Notes:** Students required to write an internship report of their creative accomplishments after completion of the internship. Students may spend up to nine months at the cooperating partner's workplace.

**Description:** Solution of engineering or management problems through a non-academic experience within the private sector or a government agency. The experience entails all or some of the following: research, design, analysis, and testing on an engineering problem. A plan, which documents how the individual will demonstrate creativity during the internship must be approved prior to the internship.

**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

**AGEN 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

**AGEN 923 Advanced Design in Agricultural Engineering**

**Prerequisites:** Agricultural engineering or permission

**Description:** The use of theories of failure, fatigue, stress concentrations, shock and impact analysis in the design of machine members. Laboratory work includes an in-depth study of the testing and analysis of machine components.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

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

**AGEN 941 Agricultural Waste Management**

**Crosslisted with:** BSEN 941

**Prerequisites:** Permission

**Description:** Aerobic, anaerobic, and physical-chemical treatment, energy recovery and protein synthesis processes for high-strength organic materials; agricultural applications including composting, ammonia stripping, nitrification, denitrification, and land disposal of organic and chemically treated materials.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

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

**AGEN 953 Advanced Irrigation and Drainage Systems Engineering**

**Prerequisites:** AGEN 853, MATH 821

**Description:** Advanced analytical considerations of environmental aspects of soil-plant systems; movement of water in soils; water movement through plants; and irrigation and drainage systems for controlling water in the soil-plant environment.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

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

**AGEN 954 Watershed Modeling**

**Prerequisites:** BSEN/AGEN 350 & GEOG/NRES 312

**Description:** Modeling of runoff, sediment and nutrients of rural and urban watersheds with the Soil and Water Assessment Tool (SWAT), including model calibration, validation and uncertainty.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

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

**Offered:** SPRING

**AGEN 957 Modeling Vadose Zone Hydrology**

**Crosslisted with:** BSEN 957, CIVE 957, GEOL 957

**Prerequisites:** MATH 221/821 or equivalent. AGEN/BSEN 350 or NRES 453/853 or equivalent.

**Notes:** Typically offered spring semester in even years.

**Description:** Principles and modeling of fluid flow and solute transport in the vadose zone. Topics include hydraulic properties of variably saturated media, application of Darcy's Law in variably saturated media, hydrologic and transport processes in the vadose zone, and solution of steady and unsteady flow problems using numerical techniques including finite element methods. Contemporary vadose zone models will be applied to engineering flow and transport problems. Review and synthesis of classic and contemporary research literature on vadose zone hydrology will be embedded in the course.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

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

**Offered:** SPRING

**AGEN 989 Seminar II**

**Crosslisted with:** BSEN 989

**Description:** Developing a graduate program, orientation to research, grant and research proposal preparation, experimental design and analysis, manuscript preparation and review, preparations and delivery of technical presentations, and research management.

**Credit Hours:** 1

**Max credits per semester:** 1

**Max credits per degree:** 1

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

**AGEN 998 Advanced Topics**

**Crosslisted with:** BSEN 998

**Prerequisites:** Permission

**Description:** Individual study in advanced engineering topics that are not covered in regular course work or thesis. Topic varies by term.

**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

**AGEN 999 Doctoral Dissertation**

**Prerequisites:** Admission to doctoral degree program and permission of supervisory committee chair

**Credit Hours:** 1-24

**Min credits per semester:** 1

**Max credits per semester:** 24

**Max credits per degree:** 99

**Grading Option:** Pass No-Pass