

# AGRICULTURAL SYSTEMS TECHNOLOGY

## Description

**Website:** <https://bse.unl.edu/agst> (<https://bse.unl.edu/agst/>)

Agricultural Systems Technology (AGST) resides at the forefront of new and emerging technologies, enabling students to solve agricultural challenges of the 21st century and beyond. This hands-on major combines coursework in technology, agricultural sciences and business. It prepares graduates with the skills to apply a systems approach to managing technology in agriculture and related industries.

This major is ideal for students interested in working with machinery and technology from a practical hands-on perspective and prepares students for a wide range of careers in a variety of industries related to agriculture, food, energy, water, and manufacturing. With a focus on experiential and hands-on learning, this major allows students to co-create their path to graduation by the intentional selection of courses in technology, agriculture and natural resources, and business and entrepreneurship. The major is designed to allow students to incorporate minors such as precision agriculture, digital agriculture, agronomy, animal science, business, and Engler agribusiness entrepreneurship.

Students in the AGST major benefit from small classes and personalized faculty advising. Students have the opportunity to work part-time with faculty who are doing cutting-edge research in agricultural technology involving robotics, automation, variable rate irrigation, agricultural drones, value-added processing, and precision agriculture in addition to pursuing industry internships for academic credit. Students are encouraged to participate in student organizations in the department such as the student branch of the American Society of Agricultural and Biological Engineers (ASABE), tractor restoration club, and participate in student competition teams such as the Husker Robotics Team, Quarter-Scale Tractor Team, and the Husker Precision Water Team.

## College Requirements

### College Admission

Requirements for admission into the College of Agricultural Sciences and Natural Resources (CASNR) are consistent with general University admission requirements (one unit equals one high school year): 4 units of English, 4 units of mathematics, 3 units of natural sciences, 3 units of social sciences, and 2 units of world language. Students must also meet performance requirements: a 3.0 cumulative high school grade point average OR an ACT composite of 20 or higher, writing portion not required OR a score of 1040 or higher on the SAT Critical Reading and Math sections OR rank in the top one-half of graduating class; transfer students must have a 2.0 (on a 4.0 scale) cumulative grade point average and 2.0 on the most recent term of attendance.

### Admission Deficiencies/Removal of Deficiencies

Students who are admitted to CASNR with core course deficiencies must remove these deficiencies within the first 30 credit hours at the University of Nebraska–Lincoln, or within the first calendar year at Nebraska, whichever takes longer. College-level coursework taken to remove deficiencies may be used to meet degree requirements in CASNR.

Deficiencies in the required entrance subjects can be removed by the completion of specified courses in the University or by correspondence.

The Office of Admissions, Alexander Building (south entrance), City Campus, provides information to new students on how deficiencies can be removed.

## College Degree Requirements Curriculum Requirements

The curriculum requirements of the College consist of three areas: ACE (Achievement-Centered Education), College of Agricultural Sciences and Natural Resources Core, and Degree Program requirements and electives. All three areas of the College Curriculum Requirements are incorporated within the description of the Major/Degree Program sections of the catalog. The individual major/degree program listings of classes ensure that a student will meet the minimum curriculum requirements of the College.

### World Languages/Language Requirement

Two units of a world language are required. This requirement is usually met with two years of high school language.

### Experiential Learning

All undergraduates in the College of Agricultural Sciences and Natural Resources must take an Experiential Learning (EL) designated course. This may include 0-credit courses designed to document co-curricular activities recognized as Experiential Learning.

### Minimum Hours Required for Graduation

The College grants the bachelors degree in programs associated with agricultural sciences, natural resources, and related programs. Students working toward a degree must earn at least 120 semester hours of credit. A minimum cumulative grade point average of C (2.0 on a 4.0 scale) must be maintained throughout the course of studies and is required for graduation. Some degree programs have a higher cumulative grade point average required for graduation. Please check the degree program on its graduation cumulative grade point average.

### Grade Rules

#### Removal of C-, D, and F Grades

Only the most recent letter grade received in a given course will be used in computing a student's cumulative grade point average if the student has completed the course more than once and previously received a grade or grades below C in that course.

The previous grade (or grades) will not be used in the computation of the cumulative grade point average, but it will remain a part of the academic record and will appear on any transcript.

A student can remove from their cumulative average a course grade of C-, D+, D, D-, or F if the student repeats the same course at the University of Nebraska and receives a grade other than P (pass), I (incomplete), N (no pass), W (withdrew), or NR (no report). If a course is no longer being offered, it is not eligible for the revised grade point average computation process.

For complete procedures and regulations, see the Office of the University Registrar website at <http://www.unl.edu/regrec/course-repeats> (<http://www.unl.edu/regrec/course-repeats/>).

#### Pass/No Pass

Students in CASNR may take any course offered on a Pass/No Pass basis within the 24-hour limitation established by the Faculty Senate. However, a department may specify that the Pass/No Pass status of its

courses be limited to non-majors or may choose to offer some courses for letter grades only.

### **GPA Requirements**

A minimum cumulative grade point average of C (2.0 on a 4.0 scale) must be maintained throughout the course of studies and is required for graduation. Some degree programs have a higher cumulative grade point average required for graduation. Please check the degree program on its graduation cumulative grade point average.

### **Transfer Credit Rules**

To be considered for admission a transfer student, Nebraska resident or nonresident, must have an accumulated average of C (2.0 on a 4.0 scale) and a minimum C average in the last semester of attendance at another college. Transfer students who have completed less than 12 credit hours of college study must submit either ACT or SAT scores.

Ordinarily, credits earned at an accredited college are accepted by the University. The College, however, will evaluate all hours submitted on an application for transfer and reserves the right to accept or reject any of them. Sixty (60) is the maximum number of hours the University will accept on transfer from a two-year college. Ninety (90) is the maximum number of hours the University will accept from a four-year college. Transfer credit in the degree program must be approved by the degree program advisor on a Request for Substitution Form to meet specific course requirements, group requirements, or course level requirements in the major. At least 9 hours in the major field, including the capstone course, must be completed at the University of Nebraska–Lincoln regardless of the number of hours transferred.

The College will accept no more than 10 semester hours of C-, D+, D, and D- grades from other schools. The C-, D+, D, and D- grades can only be applied to free electives. This policy does not apply to the transfer of grades from UNO or UNK to the University of Nebraska–Lincoln.

### **Joint Academic Transfer Programs**

The College of Agricultural Sciences and Natural Resources has agreements with many institutions to support joint academic programs. The transfer programs include dual degree programs and cooperative degree programs. Dual degree programs offer students the opportunity to receive a degree from a participating institution and also to complete the requirements for a bachelor of science degree in CASNR. Cooperative programs result in a single degree from either the University of Nebraska–Lincoln or the cooperating institution.

### **Dual Degree Programs**

#### **A to B Programs**

The A to B Program, a joint academic program offered by the CASNR and participating community colleges, allows students to complete the first two years of a degree program at the participating community college and continue their education and study in a degree program leading toward a bachelor of science degree.

The A to B Program provides a basic knowledge plus specialized coursework. Students transfer into CASNR with junior standing.

Depending on the community college, students enrolled in the A to B Program may complete the requirements for an associate of science at the community college, transfer to the University of Nebraska–Lincoln, and work toward a bachelor of science degree.

Participating community colleges include:

- Central Community College
- Metropolitan Community College
- Mid-Plains Community College
- Nebraska College of Technical Agriculture
- Nebraska Indian Community College
- Northeast Community College
- Southeast Community College
- Western Nebraska Community College

### **3+2 Programs**

Two specialized degree programs in **animal science** and **veterinary science** are offered jointly with an accredited college or school of veterinary medicine. These two programs permit CASNR animal science or veterinary science students to receive a bachelor of science degree from the University of Nebraska–Lincoln with a degree in animal science or veterinary science after successfully completing two years of the professional curriculum in veterinary medicine at an accredited veterinary school. Students who successfully complete the 3+2 Program, must provide transcripts and complete the Application for Degree form via MyRED. Students without MyRED access may apply for graduation in person at Husker Hub in the Canfield Administration Building, or by mail. Students should discuss these degree programs with their academic advisor.

### **Cooperative Degree Programs**

Academic credit from the University and a cooperating institution are applied towards a four-year degree from either the University of Nebraska–Lincoln (University degree-granting program) or the cooperating institution (non-University degree-granting program). All have approved programs of study.

### **UNL Degree-Granting Programs**

A University of Nebraska–Lincoln degree-granting program is designed to provide students the opportunity to complete a two-year program of study at one of the four-year institutions listed below, transfer to CASNR, and complete the requirements for a bachelor of science degree.

**Chadron State College.** Chadron State College offers a 2+2 program leading to a grassland ecology and management degree program and a transfer program leading to a bachelor of science in agricultural education in the teaching option.

**Wayne State College.** Wayne State College offers a 3+1 program leading to a bachelor of science in plant biology in the ecology and management option and a 3+1 program leading to a bachelor of science in Applied Science.

**University of Nebraska at Kearney.** Transfer programs are available for students pursuing degree programs leading to a bachelor of science degree.

**University of Nebraska at Omaha.** Transfer programs are available for students pursuing degree programs leading to a bachelor of science degree.

### **Non University of Nebraska–Lincoln Degree-Granting Programs**

CASNR cooperates with other institutions to provide coursework that is applied towards a degree at the cooperating institution. Pre-professional programs offered by CASNR allow students to complete the first two or three years of a degree program at the University prior to transferring and completing a degree at the cooperating institution.

**Chadron State College–Range Science.** The 3+1 Program in range science allows Chadron State College students to pursue a range science degree through Chadron State College. Students complete three years of coursework at Chadron State College and one year of specialized range science coursework (32 credit hours) at CASNR.

**Residency**

Students must complete at least 30 of the total hours for their degree using University of Nebraska–Lincoln credits. At least 18 of the 30 credit hours must be in courses offered through CASNR<sup>1</sup> (>299) including the appropriate ACE 10 degree requirement or an approved ACE 10 substitution offered through another Nebraska college and excluding independent study regardless of the number of hours transferred. Credit earned during education abroad may be used toward the residency requirement if students register through the University of Nebraska–Lincoln and participate in prior-approved education abroad programs. The University of Nebraska–Lincoln open enrollment and summer independent study courses count toward residence.

<sup>1</sup> Includes courses taught by CASNR faculty through interdisciplinary prefixes (e.g., LIFE, MBIO, ENVR, SCIL, EAEP, ENSC) and CASNR crosslisted courses taught by non-CASNR faculty.

**Online and Distance Education**

There are many opportunities to earn college credit online through the University of Nebraska–Lincoln. Some of these credits may be applicable not only as elective credits but also toward the fulfillment of the College’s education requirements. Credits earned online may count toward residency. However, certain offerings may not be counted toward scholarship requirements or academic recognition criteria.

**For further information, contact:**

Office of Online and Distance Education  
 University of Nebraska–Lincoln  
 305 Brace Labs  
 Lincoln, NE 68588-0109  
 402-472-4681  
<http://online.unl.edu/>

**Independent Study Rules**

Students wishing to take part in independent studies must obtain permission; complete and sign a contract form; and furnish copies of the contract to the instructor, advisor, departmental office, and the Dean’s Office. The contract should be completed before registration. Forms are available in 103 Agricultural Hall or online at the CASNR website.

Independent study projects include research, literature review or extension of coursework under the supervision and evaluation of a departmental faculty member.

Students may only count 12 hours of independent study toward their degrees and no more than 6 hours can be counted during their last 36 hours earned, excluding senior thesis, internships, and courses taught under an independent study number.

**Other College Degree Requirements**

**Capstone Course Requirement**

A capstone course is required for each CASNR degree program. A capstone course is defined as a course in which students are required to integrate diverse bodies of knowledge to solve a problem or formulate a policy of societal importance.

**ACE Requirements**

All students must fulfill the Achievement Centered Education (ACE) requirements. Information about the ACE program may be viewed at [ace.unl.edu](https://ace.unl.edu/) (<https://ace.unl.edu/>).

The minimum requirements of CASNR reflect the common core of courses that apply to students pursuing degrees in the college. Students should work with an advisor to satisfy ACE outcomes 1, 2, 3, 4, 6, and 10 with the college requirements.

**Catalog Rule**

Students must fulfill the requirements stated in the catalog for the academic year in which they are first admitted to the University of Nebraska–Lincoln or when they were first admitted to a Joint Academic Transfer Program. Students transferring from a community college, but without admission to a Joint Academic Transfer Program, may be eligible to fulfill the requirements as stated in the catalog for an academic year in which they were enrolled at the community college prior to attending the University of Nebraska-Lincoln. This decision should be made in consultation with academic advisors, provided the student a) was enrolled in a community college during the catalog year they are utilizing, b) maintained continuous enrollment at the previous institution for 1 academic year or more, and c) continued enrollment at the University of Nebraska-Lincoln within 1 calendar year from their last term at the previous institution. In consultation with advisors, a student may choose to follow a subsequent catalog for any academic year in which they are admitted to and enrolled as a degree-seeking student at the University of Nebraska–Lincoln in the College of Agricultural Sciences and Natural Resources. Students must complete all degree requirements from a single catalog year. The catalog which a student follows for degree requirements may not be more than 10 years old at the time of graduation.

**Learning Outcomes**

Graduates of agricultural systems technology will be able to:

1. Manage power and machinery systems at scales ranging from small farms up to industrial manufacturing environments
2. Use sensors, controls, and automated systems to make data-informed decisions for precision management
3. Analyze the economic implications of the use of equipment and technology in a system
4. Analyze the technical performance of an equipment system, evaluate alternatives, and recommend options for improvement.
5. Manage natural resources to balance environmental sustainability with economic viability
6. Work effectively in teams and engage diverse stakeholder perspectives to manage technical projects
7. Select and use appropriate tools and strategies to analyze data and professionally communicate technical information

**Major Requirements**

**Core Requirements**

<b>College Integrative Course</b>		
SCIL 101	Science and Decision-Making for a Complex World (ACE 8)	3
Credit Hours Subtotal:		3
<b>Mathematics and Statistics</b>		

MATH 102	Trigonometry	3	Select 12 hours	12	
or MATH 103	College Algebra and Trigonometry		Credit Hours Subtotal:	12	
or MATH 106	Calculus I		<b>Business and Entrepreneurship Courses</b>		
STAT 218	Introduction to Statistics (ACE 3)	3	Select 12 hours	12	
Credit Hours Subtotal:		6	Credit Hours Subtotal:	12	
<b>Communications</b>					
Select one Written Communication elective (ACE 1) of the following:		3	<b>Electives</b>		
ENGL 150	Writing and Inquiry		Students can select 9 hours of personal development courses. These courses can be used to foster a greater understanding of a topic of interest, to develop a skill, or to pursue a minor. Please consult with your academic advisor.	9	
ENGL 151	Writing for Change		Credit Hours Subtotal:	9	
JGEN 200	Technical Communication I		<b>Total Credit Hours</b>	<b>120</b>	
Select one Professional Communication elective (ACE 2) of the following:		3	<b>Major Requirements</b>		
ALEC 102	Interpersonal Skills for Leadership		<b>Complete the following courses:</b>		
COMM 209	Public Speaking		AGST 162	Introduction to Agricultural Systems Technology	1
COMM 210	Communicating in Small Groups		AGST 216	Fundamentals of Electrical Systems	3
COMM 286	Business and Professional Communication		AGST 232	Power and Machinery Principles	3
JGEN 300	Technical Communication II		AGST 262	Techno-Economic Project Management	3
Credit Hours Subtotal:		6	AGST 316	Technologies and Techniques in Digital Agriculture	3
<b>Natural Sciences</b>					
AGST 109 & 109L	Physical Principles in Agriculture and Life Sciences and Physical Principles in Agriculture and Life Sciences Laboratory (ACE 4)	5	AGST 354 / SOIL 354	Soil Conservation and Watershed Management	3
CHEM 109A & CHEM 109L	General Chemistry I and General Chemistry I Laboratory (ACE 4)	4	AGST 362	Agricultural Products Processing and Handling	3
or CHEM 113A & CHEM 113L	Fundamental Chemistry I and Fundamental Chemistry I Laboratory		AGST 395	Internship in Agricultural Systems Technology	1
Select one CASNR approved Life Sciences elective (ACE 4) of the following:		4	AGST 412	Hydraulic Power Systems	3
PLAS 131 & PLAS 132	Plant Science and Agronomic Plant Science Laboratory		AGST 416	Sensors and Control Systems for Agri-Industries	3
PLAS 131 & PLAS 134	Plant Science and Plant Sciences Laboratory		AGST 462	Managing Technology in Agricultural Systems (ACE 10)	3
BIOS 101 & 101L	General Biology and General Biology Laboratory		BSEN 130	Computer-Aided Design	2
Credit Hours Subtotal:		13	SOIL 153 / PLAS 153	Soil Resources	4
<b>Economics (ACE 6)</b>					
AECN 141	Introduction to the Economics of Agriculture (ACE 6)	3	Credit Hours Subtotal:	35	
or ECON 200	Economic Essentials and Issues		<b>Total Credit Hours</b>	<b>35</b>	
Credit Hours Subtotal:		3	<b>Technology Courses</b>		
<b>ACE Requirement</b>					
Select one course each from ACE outcomes 5, 7, and 9		9	<b>Select 12 hours from the following</b>		
Credit Hours Subtotal:		9	AGST 342	Animal Housing Systems	12
<b>Major Requirements</b>					
Complete requirements		35	AGST 431	Site-specific Crop Management	
Credit Hours Subtotal:		35	AGST 436	Embedded Controls for Agricultural Applications	
<b>Technology Courses</b>					
Select 12 hours		12	AGST 452	Irrigation Systems Management	
Credit Hours Subtotal:		12	AGST 492	Special Topics in Agricultural Systems Technology	
<b>Agriculture and Natural Resources Courses</b>					
			AGST 496	Principles and Problems in Mechanized Agriculture	
			AGST 363	Heat and Mass Transfer	
			AGST 367	Pet Food Manufacturing	
			AGST 400A	Occupational Safety	
			AGST 400E	Biorenewable Systems Technology	
			AGST 400K	Chemical Application Systems	



AGST 465	Food Engineering Unit Operations
ENSC 220	Energy Systems and Sustainability
<b>Total Credit Hours</b>	<b>12</b>

**Agriculture and Natural Resource Courses**  
**Select 12 hours from the following** **12**

PLAS 204	Resource-Efficient Crop Management
PLAS 240	Forage Crop and Pasture Management
PLAS 306	Greenhouse Practices and Management
PLAS 307	Hydroponics for Growing Populations
PLAS 366	Soil Nutrient Relationships
PLAS 405	Crop Management Strategies
PLAS 425	Cover Crops in Agroecosystems
PLAS 426	Invasive Plants
PLAS 435	Agroecology
PLAS 439	Organic Farming and Food Systems
ASCI 210	Principles of Animal Products for Today's Society
ASCI 250A	Basic Beef Cow-Calf Management
ASCI 250B	Basic Beef Stocker and Feedlot Management
ASCI 250K	Basic Swine Management
ASCI 250M	Basic Dairy Management
ASCI 250P	Basic Poultry Management
ASCI 250R	Basic Small Ruminant Management
ASCI 254	Basic Swine Science
ASCI 320	Animal Nutrition
ASCI 330	Animal Breeding and Genetics
ASCI 370	Animal Welfare
ASCI 455	Beef Cow-Calf Management
ASCI 457	Beef Feedlot Management
NRES 220	Principles of Ecology
NRES 281	Introduction to Water Science
NRES 415	GIS for Agriculture and Natural Resources
NRES 418	Introduction to Remote Sensing
<b>Total Credit Hours</b>	<b>12</b>

**Business and Entrepreneurship Courses**  
**Select 12 hours from the following** **12**

ACCT 200	Accounting for Business Decisions
AECN 201	Farm and Ranch Management
AECN 225	Agribusiness Entrepreneurship in Food Products Marketing
AECN 235	Introduction to Commodity Marketing
AECN 256	Legal Aspects in Agriculture
AECN 301	Farm Accounting, Analysis, and Tax Management
AECN 316	Agribusiness Management
AECN 325	Marketing of Agricultural Commodities
AECN 336	Grain Merchandising
AECN 425	Agricultural Marketing in a Multinational Environment
AECN 435	Advanced Agricultural Marketing Management

BLAW 300	Business, Government & Society
EAEP 201	New Venture Experience
EAEP 225	Agribusiness Entrepreneurship in Food Products Marketing
EAEP 275	Agribusiness Entrepreneurial Finance
EAEP 388	Business Systems in Entrepreneurship
EAEP 488	Entrepreneurship and Enterprise Development
ENTR 322	Family Business
FINA 300	Financial Decision Making
MNGT 300	Management Essentials For Contemporary Organizations
MRKT 300	Contemporary Marketing
<b>Total Credit Hours</b>	<b>12</b>

## Requirements for Minor Offered by Department

### Agricultural Systems Technology Minor – 18 Hours

The overall goal of the minor is to provide a foundation of technical skills to manage systems relevant to food, agriculture, and natural resources.

**Required Courses for the Minor**

AGST 216	Fundamentals of Electrical Systems	3
AGST 232	Power and Machinery Principles	3
Credit Hours Subtotal:		6

**Technical Courses**

Select 6 hours from the following: <span style="float: right;"><b>6</b></span>		
AGST 316	Technologies and Techniques in Digital Agriculture	
AGST 412	Hydraulic Power Systems	
AGST 416	Sensors and Control Systems for Agri-Industries	
AGST 436 / AGEN 436	Embedded Controls for Agricultural Applications	
Credit Hours Subtotal:		6

**Agricultural Systems Courses**

Select 6 hours from the following: <span style="float: right;"><b>6</b></span>		
AGST 342	Animal Housing Systems	
AGST 354 / SOIL 354	Soil Conservation and Watershed Management	
AGST 362	Agricultural Products Processing and Handling	
AGST 431 / AGEN 431 / PLAS 431	Site-specific Crop Management	
AGST 452 / PLAS 452	Irrigation Systems Management	
Credit Hours Subtotal:		6

**Total Credit Hours** **18**

**AGST 109 Physical Principles in Agriculture and Life Sciences**

**Prerequisites:** MATH 101 or 102 or 103 or 104 or 106; or placement in MATH 102 or 104 or 106. Credit toward the degree may be earned in only one of: AGST 109, MSYM 109, PHYS 141, PHYS 141H, or PHYS 151.

**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.

**Credit Hours:** 4

**Max credits per semester:** 4

**Max credits per degree:** 4

**Grading Option:** Graded with Option

**Prerequisite for:** AGST 109L; AGST 216; AGST 232; AGST 262; AGST 342; AGST 354, SOIL 354; AGST 362; AGST 452, AGST 852, PLAS 452; FDST 363, AGST 363

**ACE:** ACE 4 Science

**AGST 109L Physical Principles in Agriculture and Life Sciences****Laboratory**

**Prerequisites:** AGST 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

**Grading Option:** Graded with Option

**AGST 162 Introduction to Agricultural Systems Technology**

**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

**Grading Option:** Graded with Option

**AGST 216 Fundamentals of Electrical Systems**

**Prerequisites:** AGST 109 or PHYS 141, or PHYS 151, or PHYS 211

**Description:** Basic theory of electrical circuits, utilization of electric energy in production, processing, and residential applications. Theory and application of direct current (DC) and alternating current (AC) principles, switch and outlet wiring, wiring installations, selection of safe and adequate circuit devices, service equipment sizing, conductor sizing, electric motor operation and their control are covered. Develop switch and relay circuit schematics and build both DC and AC functional circuits. Ladder logic diagrams will be studied to understand the basic controls implemented in industrial automation.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Grading Option:** Graded with Option

**Offered:** SPRING

**Prerequisite for:** AGST 412; AGST 416

**AGST 232 Power and Machinery Principles**

**Prerequisites:** AGST 109, or PHYS 141, or PHYS 151, or PHYS 211, or parallel 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

**Grading Option:** Graded with Option

**Offered:** FALL

**AGST 262 Techno-Economic Project Management**

**Prerequisites:** AGST 109 or PHYS 141 or PHYS 151 or PHYS 211.

**Notes:** Open to AGST majors only.

**Description:** Professional communication of technical information. Strategies for effective teamwork to plan and execute technical projects. Fundamentals of project planning in a team-based context. Introduction to quantitative techno-economic analysis to support decision-making related to agricultural systems technology. Professional ethics in context of project management.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Grading Option:** Graded with Option

**Offered:** SPRING

**AGST 299 Career Experiences**

**Prerequisites:** Permission and advanced approval of plan or work.

**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

**Grading Option:** Pass No Pass

**AGST 316 Technologies and Techniques in Digital Agriculture**

**Prerequisites:** Junior Standing

**Notes:** Class meets once a week with the lecture and lab being taught concurrently to foster hands-on learning.

**Description:** Overview of the digital agriculture technologies and techniques to support crop and livestock production systems. Emphasis on data life cycle including generation, collection, storage, processing, visualization, and analysis. Hands-on experiences with agricultural IoT, sensing, data processing, and decision making with open-source programming tools,

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Grading Option:** Graded with Option

**Offered:** SPRING

**AGST 342 Animal Housing Systems****Prerequisites:** AGST 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**Grading Option:** Graded with Option**Offered:** FALL**AGST 354 Soil Conservation and Watershed Management****Crosslisted with:** SOIL 354**Prerequisites:** PLAS/SOIL 153; and AGST 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**Grading Option:** Graded with Option**Offered:** FALL**AGST 362 Agricultural Products Processing and Handling****Prerequisites:** AGST 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**Grading Option:** Graded with Option**Offered:** SPRING**AGST 363 Heat and Mass Transfer****Crosslisted with:** FDST 363**Prerequisites:** MATH 104 or 106; AGST 109 or PHYS 141 or 151.**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**Grading Option:** Graded with Option**AGST 367 Pet Food Manufacturing****Crosslisted with:** FDST 367**Prerequisites:** CHEM 106A and 106L or CHEM 110A and 110L**Notes:** Field trips are required and may occur outside of scheduled class time.**Description:** The companion animal industry, products, processes and career opportunities.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Grading Option:** Graded**Offered:** FALL**AGST 395 Internship in Agricultural Systems Technology****Prerequisites:** By permission**Notes:** Completion of internship approval form is required. The internship proposal is subject to approval by the Department of Biological Systems Engineering. Pass/No Pass only.**Description:** Practical experience, directed learning, and career exploration and development in a selected business, industry, agency, or educational institution.**Credit Hours:** 1-3**Min credits per semester:** 1**Max credits per semester:** 3**Max credits per degree:** 5**Grading Option:** Pass No Pass**Experiential Learning:** Internship/Co-op**AGST 400A Occupational Safety****Prerequisites:** Junior standing**Notes:** 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.**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.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Grading Option:** Graded**AGST 400E Biorenewable Systems Technology****Notes:** 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.**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.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Grading Option:** Graded**AGST 400K Chemical Application Systems****Notes:** 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.**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 agrichemicals.**Credit Hours:** 2**Max credits per semester:** 2**Max credits per degree:** 2**Grading Option:** Graded

**AGST 412 Hydraulic Power Systems****Prerequisites:** AGST 216**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**Grading Option:** Graded with Option**Offered:** SPRING**AGST 416 Sensors and Control Systems for Agri-Industries****Prerequisites:** AGST 216**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:** Graded with Option**AGST 431 Site-specific Crop Management****Crosslisted with:** AGEN 431, PLAS 431**Prerequisites:** Senior standing; PLAS/SOIL 153; PLAS 204.**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**Grading Option:** Graded with Option**AGST 433 Equipment and Tractor Testing****Crosslisted with:** AGST 833**Prerequisites:** AGST 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:** Graded with Option**Offered:** SPRING**AGST 436 Embedded Controls for Agricultural Applications****Crosslisted with:** AGEN 436, AGEN 836, 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**AGST 452 Irrigation Systems Management****Crosslisted with:** AGST 852, PLAS 452**Prerequisites:** AGST 109 or PHYS 141 or PHYS 151 or PHYS 211**Notes:** PLAS/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:** Graded with Option**Offered:** FALL**Prerequisite for:** AGEN 854, AGST 854; AGST 855**AGST 462 Managing Technology in Agricultural Systems****Crosslisted with:** AGST 862**Prerequisites:** Senior standing in AGST**Notes:** Capstone course.**Description:** Team-based activities to evaluate integration of technology into, and utilization of resources for, agricultural systems; perform technical and economic evaluations; make technical and economic recommendations; and develop professional written and oral reports. Topics include technology 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:** Graded with Option**Offered:** SPRING**ACE:** ACE 10 Integrated Product**Experiential Learning:** Case/Project-Based Learning**AGST 465 Food Engineering Unit Operations****Crosslisted with:** FDST 465, FDST 865, AGST 865**Prerequisites:** FDST/AGST 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:** Graded with Option

### AGST 469 Bio-Atmospheric Instrumentation

**Crosslisted with:** GEOG 469, PLAS 407, METR 469, NRES 469, AGRO 869, GEOG 869, HORT 807, METR 869, AGST 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:** Graded with Option

### AGST 475 Water Quality Strategy

**Crosslisted with:** NRES 475, NRES 875, SOIL 475, PLAS 475, AGRO 875, CIVE 475, CIVE 875, CRPL 475, CRPL 875, GEOL 475, GEOL 875, AGST 875

**Prerequisites:** Senior undergraduate or graduate student status.

**Notes:** Capstone course.

**Description:** Introduces methods to identify, analyze, strategize, justify and develop planning approaches to protect water quality from nonpoint source contamination. Focuses on identifying present water quality issues and situations, investigating adverse impacts on whole systems and subsystems over time, developing effective planning strategies, and assessing strategy effectiveness.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Grading Option:** Graded with Option

**Offered:** SPRING

**ACE:** ACE 10 Integrated Product

### AGST 492 Special Topics in Agricultural Systems Technology

**Crosslisted with:** AGST 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

**Grading Option:** Graded with Option

### AGST 496 Principles and Problems in Mechanized Agriculture

**Crosslisted with:** AGST 896

**Prerequisites:** 15 hours in AGST 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:** Graded with Option

### AGST 499H Honors Thesis

**Prerequisites:** Admission to the University Honors Program and permission

**Notes:** AGRI 299H recommended.

**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

**Grading Option:** Graded

## Career Information

*The following represents a sample of the internships, jobs and graduate school programs that current students and recent graduates have reported.*

### Jobs of Recent Graduates

- Operations Management LDP, Ardent Mills - Kenosha, WI
- Operations Supervisor, Cargill - Nebraska City, NE
- Production Supervisor, Land O'Lakes - Harrisburg, PA
- Operations Management, Union Pacific - Lincoln, NE
- Ag Services Operations Management, Archer Daniels Midland - Fremont, NE
- Technical Product Support Specialist, Orthman Manufacturing - Lexington, NE
- Marketing Representative - Product Support, John Deere - Waterloo, IA
- Field Test Engineer, AGCO Corporation - Hesston, KS
- Ag Specialist, JR Simplot Company - Scottsbluff, NE
- Product Support Technician, Lindsay Manufacturing - Lindsay, NE

### Internships

- Ag Services Operations Intern, ADM Grain - Corpus Christi, TX
- Marketing Intern, John Deere - Urbandale, IA
- Operations Intern, Dow AgroSciences - York, NE
- Product Support Intern, John Deere - Ottumwa, IA
- Operations Intern, ConAgra Foods - Hastings, MN
- Agronomy/Crop Scout Intern, DuPont Pioneer - York, NE
- Test Engineer Assistant, Global Industries - Grand Island, NE
- Equipment Testing Technician, CLAAS - Omaha, NE
- Plant Operations, Scoular - Omaha, NE
- Engineering Test Lab Intern, Exmark Manufacturing - Beatrice, NE

### Graduate & Professional Schools

- Master's in Agricultural & Biological Engineering, Purdue University - West Lafayette, IN
- Master's in Mechanized Systems Management, University of Nebraska-Lincoln - Lincoln, NE
- Master's in Agricultural & Biological Systems Engineering, University of Nebraska-Lincoln - Lincoln, NE
- Ph.D., Engineering, Purdue University - Richmond, IN
- Ph.D., Engineering, University of Nebraska-Lincoln - Lincoln, NE