

# 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 perspective and prepares students for a wide range of careers in a variety of industries related to agriculture, food, energy, water, and manufacturing. The program offers four options for specialization:

- Production Option
- Business Option
- Technical Option
- Processing Operations Option

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, gain hands-on experience in the Nebraska Tractor Test Laboratory, and pursue industry internships for academic credit. Students are encouraged to participate in student organizations in the department.

## 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, excluding foreign languages. Students have up to 60 credit hours to remove world language deficiencies. 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 ensures 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 his/her 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.

**Dordt College (Iowa)–Agricultural Education: Teaching Option.** This program allows students to pursue an Agricultural Education Teaching Option degree leading toward a bachelor of science in agricultural education. Students at Dordt College will complete 90 credit hours in the Agricultural Education: Teaching Option Transfer Program.

### 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, HRTM, 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

#### Integrative Courses

SCIL 101	Science and Decision-Making for a Complex World	3
AGST 462	Equipment Systems (ACE 10)	3
Credit Hours Subtotal:		6

#### Mathematics and Statistics

MATH 102 or MATH 106	Trigonometry Calculus I	3
STAT 218	Introduction to Statistics (ACE 3)	3
Credit Hours Subtotal:		6

#### Communications

BSEN 130	Computer-Aided Design	2
Select one Written Communication elective (ACE 1) of the following:		3
ENGL 150	Writing and Inquiry	
ENGL 151	Writing and Argument	
JGEN 200	Technical Communication I	
Select one Professional Communication elective (ACE 2) of the following:		3
COMM 209	Public Speaking	
COMM 210	Communicating in Small Groups	
COMM 286	Business and Professional Communication	
JGEN 300	Technical Communication II	
Credit Hours Subtotal:		8

#### Natural Sciences

CHEM 109A & CHEM 109L	General Chemistry I and General Chemistry I Laboratory (ACE 4)	4
AGST 109 & AGST 109L	Physical Principles in Agriculture and Life Sciences and Physical Principles in Agriculture and Life Sciences Laboratory (ACE 4)	5
Select one CASNR approved Life Sciences elective (ACE 4) of the following:		4
PLAS 131 & PLAS 132	Plant Science and Agronomic Plant Science Laboratory	
PLAS 131 & PLAS 134	Plant Science and Plant Sciences Laboratory	
BIOS 101 & BIOS 101L	General Biology and General Biology Laboratory	
LIFE 120 & LIFE 120L	Fundamentals of Biology I and Fundamentals of Biology I laboratory	
Select 7 hours of Natural Sciences electives from the following:		7
Biochemistry		
Biology		
Chemistry		
Geography (excluding human and economic)		
Geology		
Life Sciences (excluding 115)		
Meteorology (excluding 140)		

Physics and Astronomy (excluding PHYS 115 and ASTR 103)

ASCI 240	Anatomy and Physiology of Domestic Animals	
NRES 220	Principles of Ecology	
NRES 222	Ecology Laboratory	
PLAS 215	Genetics	
Credit Hours Subtotal:		20

#### Economics, Humanities and Social Sciences

BSEN 206 / CONE 206	Engineering Economics (ACE 8)	3
ECON 211	Principles of Macroeconomics (ACE 6)	3
ECON 212 or AECN 141	Principles of Microeconomics Introduction to the Economics of Agriculture	3
Select one course each from ACE outcomes 5, 7, and 9		9
Credit Hours Subtotal:		18

#### Major Requirements

Complete requirements	21
Credit Hours Subtotal:	21

#### Option Requirements

Complete requirements	33
Credit Hours Subtotal:	33

#### Personal Development Electives

Select 8 hours	8
Credit Hours Subtotal:	8

<b>Total Credit Hours</b>	<b>120</b>
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### Specific Major Requirements

#### Major Requirements <sup>1</sup>

AGST 162	Introduction to Agricultural Systems Technology	1
AGST 232	Power and Machinery Principles	3
AGST 245	Fundamentals of Electrical Systems	3
AGST 262	Problem Solving in Agricultural Systems Technology	1
AGST 354 / SOIL 354 / WATS 354	Soil Conservation and Watershed Management	3
AGST 364	Agricultural Products Processing and Handling	3
AGST 416	Sensors and Control Systems for Agri-Industries	3
SOIL 153 / PLAS 153	Soil Resources	4
Credit Hours Subtotal:		21
<b>Total Credit Hours</b>	<b>21</b>	

<sup>1</sup> In addition to capstone AGST 462.

#### Production Option

The production option is for students interested in careers in production agriculture such as farming, ranching, and crop consulting. The option integrates coursework in agricultural systems technology with agricultural sciences, management, and marketing. Students have

flexibility in course selection to pursue minors in areas such as agronomy and animal science.

**Option Requirements**

PLAS 204	Resource-Efficient Crop Management	3
AECN 201	Farm and Ranch Management	4
AECN 235 / MRKT 235	Introduction to Commodity Marketing	3
ASCI 250	Animal Management	3
<i>Agricultural Systems Technology Electives</i>		
Select three of the following:		9
AGST 342	Animal Housing Systems	
AGST 412	Hydraulic Power Systems	
AGST 431 / AGEN 431 / PLAS 431	Site-specific Crop Management	
AGST 433	Equipment and Tractor Testing	
AGST 452 / PLAS 452 / WATS 452	Irrigation Systems Management	
<i>Production Agriculture Electives</i>		
Select 8-11 hours from specified CASNR courses at 200 level or above <sup>1</sup>		8-11
Any 200, 300, or 400 level AGST course		
ASCI 210	Animal Products	
ASCI 254	Basic Swine Science	
ASCI 310	Fresh Meats	
ASCI 320	Animal Nutrition and Feeding	
ASCI 330	Animal Breeding and Genetics	
ASCI 370	Animal Welfare	
ASCI 451	Livestock Management on Range and Pasture	
ASCI 455	Beef Cow-Calf Management	
ASCI 456	Beef Cattle Merchandising	
ASCI 457	Beef Feedlot Management	
ASCI 485	Animal Systems Analysis	
ENTO 308	Management of Field Crop Insects	
ENTO 412	Entomology and Pest Management	
PLAS 240	Forage Crop and Pasture Management	
PLAS 245	Introduction to Grassland Ecology and Management	
PLAS 269	Principles of Soil Management	
PLAS 270	Biological Invaders	
PLAS 306	Greenhouse Practices and Management	
PLAS 307	Hydroponics for Growing Populations	
PLAS 340	Range Management and Improvement	
PLAS 361	Soils, Environment and Water Quality	
PLAS 366	Soil Nutrient Relationships	
PLAS 405	Crop Management Strategies	
PLAS 419	Applications of Remote Sensing in Agriculture and Natural Resources	
PLAS 425	Cover Crops in Agroecosystems	
PLAS 426	Invasive Plants	
PLAS 435	Agroecology	

PLAS 439	Organic Farming and Food Systems	
PLAS 445	Livestock Management on Range and Pasture	
<i>Option Electives</i>		
Select 0-3 hours from the following:		0-3
AGST 395	Internship in Agricultural Systems Technology	
MATH 104	Applied Calculus	
Business or agricultural economics course (ACCT, AECN, BLAW, EAEP, ENTR, ECON, FINA, MNGT, MRKT class any level)		
Credit Hours Subtotal:		33-36
<b>Total Credit Hours</b>		<b>33-36</b>

<sup>1</sup> Please contact advisor to discuss selection of classes.

**Business Option**

The business option is for students interested in business-related careers such as marketing, sales, and management in agriculture and related industries. This option integrates coursework in agricultural systems technology with additional business courses. Students can easily pursue a business minor with this option.

**Option Requirements**

ACCT 200	Accounting for Business Decisions	3
PLAS 204	Resource-Efficient Crop Management	3
or ASCI 250	Animal Management	
MATH 104	Applied Calculus	3
<i>Agricultural Systems Technology Electives</i>		
Select 9 hours from the following:		9
AGST 342	Animal Housing Systems	
AGST 395	Internship in Agricultural Systems Technology	
AGST 400E	Biorenewable Systems Technology	
AGST 412	Hydraulic Power Systems	
AGST 431 / AGEN 431 / PLAS 431	Site-specific Crop Management	
AGST 452 / PLAS 452 / WATS 452	Irrigation Systems Management	
<i>Business Law Elective</i>		
Select one of the following:		3
AECN 256	Legal Aspects in Agriculture	
AECN 357 / NREE 357	Natural Resource and Environmental Law	
BLAW 300	Business, Government & Society	
<i>Finance Elective</i>		
AECN 452	Agricultural Finance	3
or FINA 300	Financial Decision Making	
<i>Marketing Elective</i>		
Select one of the following:		3
AECN 225 / EAEP 225 / MRKT 225	Agribusiness Entrepreneurship in Food Products Marketing	

AECN 235 / MRKT 235	Introduction to Commodity Marketing	
MRKT 300	Contemporary Marketing	
<i>Management Electives</i>		
Select two of the following:		6-7
AECN 201	Farm and Ranch Management	
AECN 316	Agribusiness Management	
MNGT 300	Management Essentials For Contemporary Organizations	
MNGT 322 / ENTR 322	Family Business	
MNGT 361	Human Resource Management	
Credit Hours Subtotal:		33-34
<b>Total Credit Hours</b>		<b>33-34</b>

### Technical Option

The technical option is for students interested in hands-on technical careers such as test engineers, product support specialists, and service managers. This option integrates coursework in agricultural systems technology with additional coursework in engineering. This option will also prepare students for graduate study.

#### Option Requirements

MATH 106	Calculus I	5
AGST 395	Internship in Agricultural Systems Technology	1-3
or AGST 400A	Occupational Safety	
AGST 412	Hydraulic Power Systems	3
AGST 433	Equipment and Tractor Testing	3
Select one of the following:		3
PLAS 204	Resource-Efficient Crop Management	
ASCI 250	Animal Management	
ASCI 210	Animal Products	

#### Management Electives

Select two of the following:		6
AECN 316	Agribusiness Management	
MNGT 300	Management Essentials For Contemporary Organizations	
MNGT 361	Human Resource Management	

#### Option Electives

Select four of the following:		12
ENSC 220	Introduction to Energy Systems	
CNST 305 / ARCH 333	Building Environmental Technical Systems I	
AGST 342	Animal Housing Systems	
AGST 431 / AGEN 431 / PLAS 431	Site-specific Crop Management	
AGST 400E	Biorenewable Systems Technology	
AGST 436 / AGEN 436	Embedded Controls for Agricultural Applications	
AGST 452 / PLAS 452 / WATS 452	Irrigation Systems Management	

Credit Hours Subtotal:	33-35
<b>Total Credit Hours</b>	<b>33-35</b>

### Processing Operations Option

The processing operations option is for students interested in careers in operations management for food, feed, and fuel companies. This option integrates coursework in agricultural systems technology, with business, agricultural sciences, and food sciences. This option will also prepare students for graduate study.

#### Option Requirements

PLAS 437	Animal, Food and Industrial Uses of Grain	2
AECN 235 / MRKT 235	Introduction to Commodity Marketing	3
ASCI 210	Animal Products	3
MATH 104	Applied Calculus	3-5
or MATH 106	Calculus I	
AGST 395	Internship in Agricultural Systems Technology	1-3
or AGST 400A	Occupational Safety	
MNGT 300	Management Essentials For Contemporary Organizations	3
or AECN 316	Agribusiness Management	
AGST 363 / FDST 363	Heat and Mass Transfer	3
AGST 412	Hydraulic Power Systems	3
AGST 465 / FDST 465	Food Engineering Unit Operations	3

#### Processing Electives

Select 7-9 hours from the following:		7-9
PLAS 438	Producing Grain for Animal, Food and Industrial Uses	
ASCI 410	Processed Meats	
ENSC 220	Introduction to Energy Systems	
FDST 205	Food Composition and Analysis	
FDST 403	Food Quality Assurance	
FDST 412	Cereal Technology	
FDST 413	Baking Technology	
FDST 420	Fruit and Vegetable Technology	
FDST 429	Dairy Products Technology	

Credit Hours Subtotal:	33-37
<b>Total Credit Hours</b>	<b>33-37</b>

### Electives

Students can select 9 credit hours of personal development electives. These electives can be used to foster a greater understanding of a topic of interest, to develop an inherent skill, or to pursue a minor.

## Requirements for Minor Offered by Department

### Mechanized Systems Management 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 232	Power and Machinery Principles	3
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AGST 245	Fundamentals of Electrical Systems	3
Credit Hours Subtotal:		6
<b>Technical electives</b>		
Select 6 hours from the following:		6
AGST 412	Hydraulic Power Systems	
AGST 416	Sensors and Control Systems for Agri-Industries	
AGST 433	Equipment and Tractor Testing	
AGST 436 / AGEN 436	Embedded Controls for Agricultural Applications	
Credit Hours Subtotal:		6
<b>Agricultural Systems Electives</b>		
Select 6 hours from the following:		6
AGST 342	Animal Housing Systems	
AGST 354 / SOIL 354 / WATS 354	Soil Conservation and Watershed Management	
AGST 364	Agricultural Products Processing and Handling	
AGST 431 / AGEN 431 / PLAS 431	Site-specific Crop Management	
AGST 452 / PLAS 452 / WATS 452	Irrigation Systems Management	
Credit Hours Subtotal:		6
<b>Total Credit Hours</b>		<b>18</b>

**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.

**Notes:** Students cannot receive credit for both AGST 109 and PHYS 141 or 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 232; AGST 245; AGST 262; AGST 342; AGST 354, SOIL 354, WATS 354; AGST 364; AGST 452, AGST 852, WATS 452, 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 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 245 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 262 Problem Solving in Agricultural Systems Technology**

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

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

**Description:** Use of computational tools to solve problems relevant to mechanized systems management. Professional communication of technical information. Discussion of current and emerging issues relevant to the major.

**Credit Hours:** 1

**Max credits per semester:** 1

**Max credits per degree:** 1

**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, WATS 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 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 364 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 367 Pet Food Manufacturing**

**Crosslisted with:** FDST 367

**Prerequisites:** FDST 205

**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 245

**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 245 or permission.

**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, WATS 452, 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 Equipment Systems****Crosslisted with:** AGST 862**Prerequisites:** Senior standing in AGST**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:** 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, WATS 475, PLAS 475, AGRO 875, CIVE 475, CIVE 875, CRPL 475, CRPL 875, GEOL 475, GEOL 875, AGST 875, 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:** Graded with Option**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

## PLEASE NOTE

This document represents a sample 4-year plan for degree completion with this major. Actual course selection and sequence may vary and should be discussed individually with your college or department academic advisor. Advisors also can help you plan other experiences to enrich your undergraduate education such as internships, education abroad, undergraduate research, learning communities, and service learning and community-based learning.

## Agricultural Systems Technology - Business

- Ph.D., Engineering, Purdue University - Richmond, IN
- Ph.D., Engineering, University of Nebraska-Lincoln - Lincoln, NE

## Agricultural Systems Technology - Processing Operations

## Agricultural Systems Technology - Production

## Agricultural Systems Technology - Technical

### 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