Agricultural Engineering

Description

Website: http://agen.unl.edu/

Agricultural engineering (AGEN) is one of two engineering degree programs offered in the Department of Biological Systems Engineering. AGEN students emphasize course work in one of three engineering areas; machine design, test, or soil and water resources. Thus, some agricultural engineers are involved in the analysis and design of field machinery systems and machine components through study of the principles of mechanical design, joining techniques, hydraulics, controls, ergonomics, and safety. Others are evaluating machine or mechanical system functional performance based on study of test procedure standards, measurements, data acquisition, electronic communication and statistics, and practical experience gained at the Nebraska Tractor Test Laboratory. Still others are analyzing and designing soil and water management-related infrastructure as aided through study of irrigation, drainage, erosion and runoff control techniques, crop tillage and cultivation practices and natural resources management. Job opportunities for graduates are available in industry, public agencies, consulting, and private practice.

By two to six years after graduation, AGEN graduates (whether they are involved in machine design, product and performance testing, soil and water resources, or other professional endeavors such as business or law) will be:

- applying their unique educational backgrounds in agricultural engineering by providing appropriate solutions to problems and adding value to the research, development, and design processes encountered in a variety of work environments;
- considering systems as a whole when solving problems, looking beyond components and subsystems individually;
- confidently using the necessary elements of mathematics, statistics, physical science, engineering, computer-based measurement and analysis tools and current literature in solving problems and providing design solutions;
- successfully integrating technical knowledge with organizational, listening, communication, and interpersonal skills to lead and work effectively in teams, and to respectfully articulate the role of engineering decisions in the workplace, community, and world;
- responsibly addressing issues such as health and safety, personal and professional ethics, cultural diversity, as well as the social, environmental, and global impacts of their work; and
- continuing their personal growth, professional development, and professional and community service, through various opportunities provided by institutions, professional organizations and other venues.

The Department of Biological Systems Engineering is located in Chase Hall on East Campus. AGEN students participate in classes and laboratories on both the East and City Campuses. AGEN courses are offered on the East Campus. Basic courses in math, chemistry, physics, engineering, computers, and electives in mechanical, civil, electrical, and chemical engineering are taken on the City Campus. Convenient bus transportation is available between campuses.

Students benefit from small classes and personal acquaintances with faculty. In consultation with their advisor, students select electives that permit specialization in an emphasis area applicable to their career aspirations. Many students work part-time on departmental research projects, gaining valuable experience for graduate study and future employment. Students also benefit from summer jobs, internships and co-op programs. These opportunities give students practical experience to learn about careers in engineering. Students also gain valuable experience through participation in professional organizations such as the American Society of Agricultural and Biological Engineers, the Soil and Water Resources Club, the Nebraska Society of Professional Engineers and the Society for Women Engineers.

Major Department Admission

Pre-professionally admitted COE students majoring in agricultural engineering (AGEN) have their records examined for advancement to professionally admitted status during the fall, spring, and summer immediately following the term in which 43 or more credits applicable to the AGEN degree have been completed. Students must be professionally admitted in order to enroll in AGEN 470/BSEN 470 Design I in Agricultural and Biological Systems Engineering.

To be professionally admitted to AGEN, the student must first meet the general professional admission criteria of the College of Engineering (i.e., completion of at least one semester in the College, a cumulative GPA of 2.5 or greater, and not having been already declined admission by two other engineering majors). AGEN professional admission criteria requires consistent grades of C or better in calculus, calculus-based physics, chemistry, communications, and engineering science courses. Specifically, the student must have completed MECH 223 Engineering Statics and AGEN 225/BSEN 225 Engineering Properties of Biological Materials with grades of a C or better to gain professional admission to AGEN. In addition, the student must complete the AGEN/BSEN Writing Assessment Exam (i.e., Grammar Slammer) before professional admission is granted.

Students who meet the above criteria with a cumulative GPA of 3.0 or greater with all grades above a C in UNL mathematics, science, engineering, and communications courses, and scoring 70 percent or higher on the AGEN/BSEN Writing Assessment Exam may be professionally admitted without further review by Department faculty. Students scoring less than 70 percent on the AGEN/BSEN Writing Assessment Exam must agree to a writing improvement plan with their academic advisor in order to be granted professional admission. Students not meeting the 3.0 GPA standard, or having grades below a C in the listed areas, will have their record reviewed by Department faculty for evidence of ability to succeed in AGEN. Under special circumstances, the Department may elect to defer professional admission for an additional term.

The Department faculty may recommend provisional admission and specify deficiencies and performance criteria to transition out of provisional status. If a student has not met the admission criteria and has not, in the opinion of the Department faculty demonstrated a minimum standard of good professional judgment in the pursuit of their academic program as expected of degreed engineers, they may be denied professional admission to the degree program. The student may appeal this decision to the BSE Department Head and then, if necessary, to the College of Engineering Curriculum and Academic Standards Committee.
College Requirements

College Admission

College Entrance Requirements
Students must have high school credit for (one unit is equal to one high school year):

1. 4 units of mathematics: 2 of algebra, 1 of geometry, 1 of precalculus and trigonometry.
2. 4 units of English.
3. 3 units of natural science that must include 1 unit of physics and 1 unit of chemistry (chemistry requirement waived for students in construction management).
4. 2 units of a single foreign language.
5. 3 units of social studies.
6. Students having a composite ACT score of 28 or greater (or equivalent SAT score) will be admitted to the College of Engineering even if they lack any one of the following: trigonometry, chemistry, or physics.
7. Students having an ACT score of 19 or less in English (or equivalent SAT score) must take ENGL 150 Writing and Inquiry or ENGL 151 Writing and Argument.

A total of 16 units is required for admission.

Students must have an ACT (enhanced) score of 24 or greater (or equivalent SAT). Students who lack entrance requirements may be admitted based on ACT scores, high school rank and credits, or may be admitted to pre-engineering status in the Exploratory and Pre-Professional Advising Center. Pre-engineering students are advised within the College of Engineering.

Students for whom English is not their language of nurture must meet the minimum English proficiency requirements of the University.

Students who lack entrance units may complete precollege training by Independent Study through the UNL Office of On-line and Distance Education, in summer courses, or as a part of their first or second semester course loads while in the Exploratory and Pre-Professional Advising Center or other Colleges at UNL.

Students should consult their advisor, their department chair, or the Office of the Dean if they have questions on current policies.

Other Admission Requirements
Students who transfer to the University of Nebraska–Lincoln from other accredited colleges or universities and wish to be admitted to the College of Engineering (COE) must meet COE freshman entrance requirements and have a minimum cumulative GPA of 2.5 for Nebraska residents or 3.0 for non-residents. Students not meeting either of these requirements must enroll in the Explore Center or another UNL college until they meet COE admission requirements.

The COE accepts courses for transfer for which a C or better grade was received. Although UNL accepts D grades from the University of Nebraska at Kearney and at Omaha, not all majors in the COE accept such low grades. Students must conform to the requirements of their intended major and, in any case, are strongly encouraged to repeat courses with a grade of C- or less.

All transfer students must adopt the curricular requirements of the undergraduate bulletin current at the time of transfer to the COE—not that in use when they entered UNL. Upon admission to UNL, students wishing to pursue degree programs in the COE will be classified and subject to the policies defined in the subsequent section.

College Degree Requirements

Grade Rules

Grade Appeals
In the event of a dispute involving any college policies or grades, the student should appeal to his/her instructor, and appropriate department chair or school director (in that order). If a satisfactory solution is not achieved, the student may appeal his/her case through the College Academic Appeals Committee on his/her campus.

Bulletin Rule

Students must fulfill the requirements stated in the bulletin for the academic year in which they are first admitted at UNL. In consultation with advisors, a student may choose to follow a subsequent bulletin for any academic year in which they are admitted to and enrolled as a degree-seeking student at UNL in the College of Engineering. Students must complete all degree requirements from a single bulletin year. The bulletin which a student follows for degree requirements may not be more than 10 years old at the time of graduation.

Learning Outcomes

Majors in agricultural engineering will be able to:

1. Apply knowledge of mathematics, physical sciences, and the engineering sciences (a).
2. Apply knowledge of agriculture, natural resources, and agricultural engineering (a).
3. Design and conduct experiments, utilize probability and statistics, as well as to analyze and interpret data (b).
4. Design a system, component, or process to meet desired needs (c).
5. Function on teams, including multi-disciplinary teams (d).
6. Identify, formulate, and solve engineering problems (e).
7. Understand professional and ethical responsibility (f).
8. Communicate effectively (g).
9. Understand the impact of engineering solutions in a global and societal context (h).
10. Recognize the need for, and an ability to engage in, life-long learning (i).
11. Have knowledge of contemporary issues (j).
12. Use the techniques, skills, and modern engineering tools necessary for engineering practice (k).

*Letters are references to ABET Engineering Accreditation Commission outcomes (a through k.)

Major Requirements

Specific Major Requirements

First Semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>AGEN 100 /</td>
<td>Introduction to Biological Engineering and</td>
<td>1</td>
</tr>
<tr>
<td>BSEN 100</td>
<td>Agricultural Engineering</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 109</td>
<td>General Chemistry I</td>
<td>4</td>
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<tr>
<td>ENGR 10</td>
<td>Freshman Engineering Seminar</td>
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<tr>
<td>MATH 106</td>
<td>Calculus I</td>
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Leadership Communication Elective

Select one of the following: 3

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<tbody>
<tr>
<td>ALEC 102</td>
<td>Interpersonal Skills for Leadership</td>
</tr>
<tr>
<td>COMM 210</td>
<td>Communicating in Small Groups</td>
</tr>
<tr>
<td>COMM 286</td>
<td>Business and Professional Communication</td>
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<td>Course Code</td>
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<tr>
<td>ENGR 100</td>
<td>Interpersonal Skills for Engineering Leaders (recommended)</td>
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<tr>
<td>AGRO 131</td>
<td>Plant Science</td>
</tr>
<tr>
<td>AGRO 153</td>
<td>Soil Resources</td>
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**Agricultural Engineering Requirements**

**First Semester**
- ENGR 100: Interpersonal Skills for Engineering Leaders (recommended)
- AGRO 131: Plant Science
- AGRO 153: Soil Resources
- BIOS 101: General Biology
- LIFE 120: Fundamentals of Biology I
- LIFE 120L: Fundamentals of Biology I laboratory

Credit Hours Subtotal: 16

**Second Semester**
- AGEN 112 / BSEN 112: Computer-Aided Problem-Solving 2
- CHEM 110: General Chemistry II 4
- MATH 107: Calculus II 4
- PHYS 211: General Physics I 4

Credit Hours Subtotal: 14

**Third Semester**
- AGEN 225 / BSEN 225: Engineering Properties of Biological Materials 3
- ENGR 20: Sophomore Engineering Seminar 0
- JGEN 200: Technical Communication I 3
- MATH 208: Calculus III 4
- MECH 223: Engineering Statics 3
- MSYM 232: Power and Machinery Principles 3

Credit Hours Subtotal: 16

**Fourth Semester**
- AGEN 212A / BSEN 212A: Computational Tools & Modeling for Agricultural & 1
- AGEN 212B / BSEN 212B: Computational Tools & Modeling for Ag & 1
- AGEN 212E / BSEN 212E: Biological Systems Eng: LabVIEW 1
- MATH 221: Differential Equations 3
- MECH 130: Introduction to CAD 3
- MECH 373: Engineering Dynamics 3
- PHYS 212: General Physics II 4

Credit Hours Subtotal: 16

**Fifth Semester**
- AGEN 324 / BSEN 324: Mechanics of Materials for Agricultural and 3
- CIVE 310 / MECH 310: Fluid Mechanics 3
- ECEN 211: Elements of Electrical Engineering I 3
- MECH 200: Engineering Thermodynamics 3

**ACE Elective**
- Select one course from not yet satisfied ACE outcomes 5, 6, 7, or 9 3

Credit Hours Subtotal: 15

**Sixth Semester**
- AGEN 303 / BSEN 303: Principles of Process Engineering 3
- AGEN 325 / BSEN 325: Power Systems Design 3
- AGEN 344 / BSEN 344: Biological and Environmental Transport Processes 3
- BSEN 206: Engineering Economics 3
- MECH 321: Engineering Statistics and Data Analysis or MATH 380: Statistics and Applications 3

Credit Hours Subtotal: 15

**Seventh Semester**
- AGEN 424: Machine Design in Agricultural Engineering 3
- AGEN 453 / BSEN 453: Irrigation and Drainage Systems Engineering 3
- AGEN 460 / BSEN 460: Instrumentation and Controls 3
- AGEN 470 / BSEN 470: Design I in Agricultural and Biological Systems Engineering 1

**Emphasis Elective**
- Select 6 hours

Credit Hours Subtotal: 15

**Eighth Semester**
- AGEN 480 / BSEN 480: Design II in Agricultural and Biological Systems Engineering 3

**ACE Electives**
- Select 3 courses from not yet satisfied ACE outcomes 5, 6, 7, or 9 9

**Emphasis Elective**
- Select 3 hours

Credit Hours Subtotal: 15

Total Credit Hours: 123

**AGEN Primary Emphasis Area Requirements**

An emphasis area requires 6 hours.

**Soil and Water Resources Engineering**
- AGEN 350 / BSEN 350: Soil and Water Resources Engineering 3

Select one of the following: 3
- AGEN 441 / BSEN 441: Animal Waste Management
- BSEN 455 / CIVE 455: Nonpoint Source Pollution Control Engineering
- BSEN 458 / CIVE 458: Groundwater Engineering

**STEM Elective - Select 3 hours from the following:** 3
- AGEN 441: Animal Waste Management
- AGEN 443: Design of Light-Frame Structures
- AGEN 395: Internship in Agricultural and Biological Systems Engineering
- AGEN 492: Special Topics in Agricultural Engineering
- AGEN 496: Independent Study
- BSEN 326: Introduction to Environmental Engineering
- BSEN 355: Introduction to Ecological Engineering
- BSEN 422: Pollution Prevention: Principles and Practices
- BSEN 455: Nonpoint Source Pollution Control Engineering
- BSEN 458: Groundwater Engineering
- CHME 330: Chemical Engineering Laboratory I
- CHME 489: Air Pollution, Assessment and Control
### Additional Major Requirements

#### Grade Rules

**C- and D Grades**

A grade of C- or better is required for all agricultural engineering required courses and electives that are to count toward graduation, with the exception of ACE 5, 6, 7, 8, and 9 electives.

#### Bulletin To Use

In addition to the “Bulletin Rule” of the College of Engineering, students transferring into the Department of Biological Systems Engineering must follow the bulletin in effect at the time of their transfer into the department.
AGEN 212 Computational Tools and Modeling for Agricultural and Biological Systems
Crosslisted with: BSEN 212
Prerequisites: AGEN or BSEN 112/112H; or permission
Description: Introduction to tools needed to develop computational-intensive solutions relevant to agricultural and biological systems engineering. Advanced problem solving techniques using examples of scripts, simulation methods, graphical programming, and their combination.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

AGEN 212A Computational Tools & Modeling for Agricultural & Biological Systems Eng: MATLAB
Crosslisted with: BSEN 212A
Prerequisites: AGEN or BSEN 112/112H; or permission
Description: Introduction to tools needed to develop computation-intensive solutions for a wide variety of problems relevant to agricultural and biological systems engineering. Advanced problem solving techniques are illustrated using examples of scripts.
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 1
Format: LEC
Prerequisite for: BSEN 311, BSEN 311H; MECH 350, MECH 350H

AGEN 212B Computational Tools & Modeling for Ag & Biological Sys Engr: Control Systems
Crosslisted with: BSEN 212B
Prerequisites: AGEN or BSEN 112/112H; ELEC 211 or ELEC 213 or PHYS 212, or parallel; or permission
Description: Introduction to microcontroller based embedded systems for agricultural and biological applications. Fundamental principles of microcontrollers and embedded systems through binary and hexadecimal number systems, digital logic, programming in integrated development environment, and microcontroller peripherals. Common agricultural and biological microcontroller input and output devices. This is a 5-week mini-course in which the lab time entails a combination of a 2nd lecture and followup laboratory applications.
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 1
Format: LEC

AGEN 212E Computational Tools & Modeling for Agricultural & Biological Systems Eng: LabVIEW
Crosslisted with: BSEN 212E
Prerequisites: AGEN or BSEN 112/112H; or permission
Description: Introduction to tools needed to develop computation-intensive solutions for a wide variety of problems relevant to agricultural and biological systems engineering. Advanced problem solving techniques are illustrated using examples of scripts, simulation methods, graphical programming, and their combination.
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 1
Format: LEC

AGEN 225 Engineering Properties of Biological Materials
Crosslisted with: AGEN 225H, BSEN 225, BSEN 225H
Prerequisites: MATH 106
Description: Physical properties important to the design of harvesting, storage, and processing systems for agricultural crops; principles and techniques for measurement of properties including frictional effects, particle size, strength, moisture content, specific heat, and thermal conductivity.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Prerequisite for: AGEN 324, BSEN 324

AGEN 225H Engineering Properties of Biological Materials
Crosslisted with: AGEN 225, BSEN 225, BSEN 225H
Prerequisites: MATH 106
Description: Physical properties important to the design of harvesting, storage, and processing systems for agricultural crops; principles and techniques for measurement of properties including frictional effects, particle size, strength, moisture content, specific heat, and thermal conductivity.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

AGEN 303 Principles of Process Engineering
Crosslisted with: AGEN 303H, BSEN 303, BSEN 303H
Prerequisites: MATH 221 or permission.
Description: Introduction to performance parameters and characteristics of pumps, fans, presses, and solids handling, size reduction, separation and agitation equipment. Application of the various technologies studied with analysis of example systems.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

AGEN 303H Principles of Process Engineering
Crosslisted with: AGEN 303, BSEN 303, BSEN 303H
Prerequisites: MATH 221 or permission.
Description: Introduction to performance parameters and characteristics of pumps, fans, presses, and solids handling, size reduction, separation and agitation equipment. Application of the various technologies studied with analysis of example systems.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
AGEN 324 Mechanics of Materials for Agricultural and Biological Systems Engineering
Crosslisted with: BSEN 324
Prerequisites: AGEN/BSEN 225, MECH 223
Description: Development of the concepts of stress and strain relevant to agricultural and biological systems. Stress analysis of axial, torsional, and bending stresses, combined loading analysis, deflection evaluation, static and dynamic failure theory. Practical applications in agricultural and biological systems will be discussed.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

AGEN 325 Power Systems Design
Crosslisted with: AGEN 325H, BSEN 325, BSEN 325H
Prerequisites: PHYS 212 or ELEC 211, and MECH/CIVE 310 or CHME 332 or parallel or permission.
Description: Fundamentals of Power systems for machines. Introduction to fluid power (hydraulics, pneumatics), pumps, motors, cylinders, control devices and system design. Selection of electric motors as power sources, operating characteristics and circuits. Selection of internal combustion engines as power sources.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

AGEN 325H Power Systems Design
Crosslisted with: AGEN 325, BSEN 325, BSEN 325H
Prerequisites: PHYS 212 or ELEC 211, and MECH/CIVE 310 or CHME 332 or parallel or permission.
Description: Fundamentals of Power systems for machines. Introduction to fluid power (hydraulics, pneumatics), pumps, motors, cylinders, control devices and system design. Selection of electric motors as power sources, operating characteristics and circuits. Selection of internal combustion engines as power sources.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

AGEN 344 Biological and Environmental Transport Processes
Crosslisted with: AGEN 344H, BSEN 344, BSEN 344H
Prerequisites: BSEN 244 or MECH 200; MATH 221; MECH/CIVE 310 or CHME 332 or parallel; or permission
Description: Introduction to concurrent transport of energy and mass in biological and environmental processes. Modes of heat transfer, steady and non-steady state heat conduction, convective heat transfer, radiative heat transfer, and heat transfer with phase change. Equilibrium, kinetics, and modes of mass transfer, diffusion, dispersion, and convective mass transfer. Soil freezing and thawing, energy and mass balances of crops, diffusivities of membranes, photosynthesis, human and animal energy balances, and respiration.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Prerequisite for: AGEN 470, BSEN 470

AGEN 350 Soil and Water Resources Engineering
Crosslisted with: BSEN 350
Prerequisites: MATH 221 and parallel: MECH/CIVE 310 or CHME 332.
Description: Introduction to soil and water resources and the engineering processes used to analyze watersheds. Soil water relations, evapotranspiration, precipitation, runoff, erosion, flow in natural waterways and through reservoirs, wetland and groundwater hydrology, and water quality. Geographic information system utilized to develop maps and analyze watershed characteristics. A selected watershed is investigated.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Prerequisite for: AGEN 957, BSEN 957, CIVE 957, GEOL 957

AGEN 395 Internship in Agricultural and Biological Systems Engineering
Prerequisites: Permission
Notes: Completion of internship approval form is required. The internship proposal is subject to approval by the Department of Biological Systems Engineering.
Description: Practical experience, directed learning, and career exploration and development in a selected business, industry, agency, or educational institution. Activities must include a significant engineering component.
Credit Hours: 1-3
Min credits per semester: 1
Max credits per semester: 3
Max credits per degree: 3
Format: FLD

AGEN 424 Machine Design in Agricultural Engineering
Crosslisted with: AGEN 424H, AGEN 824
Prerequisites: Senior standing and MECH 325.
Description: Design of machine elements. Definition, analysis, and solution of a design problem in agricultural engineering.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
AGEN 424H Machine Design in Agricultural Engineering  
Crosslisted with: AGEN 424, AGEN 824  
Prerequisites: Senior standing and MECH 325.  
Description: Design of machine elements. Definition, analysis, and solution of a design problem in agricultural engineering.  
Credit Hours: 3  
Max credits per semester: 3  
Max credits per degree: 3  
Format: LEC

AGEN 431 Site-specific Crop Management  
Crosslisted with: AGRO 431, MSYM 431  
Prerequisites: Senior standing; AGRO/SOIL 153; AGRO 204; or permission.  
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  
Format: LEC

AGEN 441 Animal Waste Management  
Crosslisted with: AGEN 841, BSEN 441, BSEN 841  
Prerequisites: Senior standing.  
Description: Characterization of wastes from animal production. Specification and design of collection, transport, storage, treatment, and land application systems. Air and water pollution, regulatory and management aspects.  
Credit Hours: 3  
Max credits per semester: 3  
Max credits per degree: 3  
Format: LEC

AGEN 443 Design of Light-Frame Structures  
Prerequisites: MECH 325  
Description: Engineering design for strength, economy, function and safety of light-frame structures; emphasis on wood, concrete, and steel elements; design project required.  
Credit Hours: 3  
Max credits per semester: 3  
Max credits per degree: 3  
Format: LEC

AGEN 446 Unit Operations of Biological Processing  
Crosslisted with: BSEN 446, BSEN 846, AGEN 846  
Prerequisites: AGEN 225 or BSEN 225 and CHEM 332 or equivalent.  
Description: Application of heat, mass, and moment transport in analysis and design of unit operations for biological and agricultural materials. Evaporation, drying, distillation, extraction, leaching, thermal processing, membrane separation, centrifugation, and filtration.  
Credit Hours: 3  
Max credits per semester: 3  
Max credits per degree: 3  
Format: LEC

AGEN 453 Irrigation and Drainage Systems Engineering  
Crosslisted with: AGEN 853, BSEN 453, BSEN 853  
Prerequisites: CIVE 310 or MECH 310; AGEN 344 or BSEN 344; or permission.  
Description: Analytical and design consideration of evapotranspiration, soil moisture, and water movement as related to irrigation and drainage systems; analysis and design of components of irrigation and drainage systems including water supplies, pumping plants, sprinkler systems, and center pivots.  
Credit Hours: 3  
Max credits per semester: 3  
Max credits per degree: 3  
Format: LEC

AGEN 460 Instrumentation and Controls  
Crosslisted with: AGEN 860, BSEN 460, BSEN 860  
Prerequisites: ELEC 211 or ELEC 215; or permission  
Description: Analysis and design of instrumentation and controls for agricultural and biological production, management and processing. Theory of basic sensors and transducers, analog and digital electrical control circuits, and the interfacing of computers with instruments and controls. Emphasis on signal analysis and interpretation for improving system performance.  
Credit Hours: 3  
Max credits per semester: 3  
Max credits per degree: 3  
Format: LEC

AGEN 470 Design I in Agricultural and Biological Systems Engineering  
Crosslisted with: BSEN 470  
Prerequisites: BSEN or MECH 130 and AGEN or BSEN 344; Prereq or Parallel: AGEN or BSEN 460 and at least two courses from primary emphasis area; or permission  
Description: Definition, scope, analysis, and synthesis of a comprehensive design problem within the areas of emphasis in the Department of Biological Systems Engineering. Identification of a client’s engineering problem to solve, and development of objectives and anticipated results.  
Credit Hours: 1  
Max credits per semester: 1  
Max credits per degree: 1  
Format: LEC  
Prerequisite for: AGEN 480, BSEN 480

AGEN 480 Design II in Agricultural and Biological Systems Engineering  
Crosslisted with: BSEN 480  
Prerequisites: BSEN/AGEN 470  
Description: Definition, scope, analysis, and synthesis of a comprehensive engineering problem in an engineering area of emphasis within the Department of Biological Systems Engineering. Design activity using the team approach to develop a solution.  
Credit Hours: 3  
Max credits per semester: 3  
Max credits per degree: 3  
Format: LAB  
ACE: ACE 10 Integrated Product
AGEN 492 Special Topics in Agricultural Engineering  
Crosslisted with: AGEN 892  
Prerequisites: Permission  
Description: Subject matter in emerging areas of Agricultural Engineering not covered in other courses within the curriculum. Topics, activities, and delivery methods vary.  
Credit Hours: 1-6  
Min credits per semester: 1  
Max credits per semester: 6  
Max credits per degree: 6  
Format: LEC  

AGEN 496 Independent Study  
Crosslisted with: AGEN 496H, BSEN 496, BSEN 496H  
Prerequisites: Permission  
Description: Investigation and written report on engineering problems not covered in sufficient depth through existing courses. Topics vary.  
Credit Hours: 1-6  
Min credits per semester: 1  
Max credits per semester: 6  
Max credits per degree: 6  
Format: IND  

AGEN 496H Independent Study  
Crosslisted with: AGEN 496, BSEN 496, BSEN 496H  
Description: Investigation and written report on engineering problems not covered in sufficient depth through existing courses. Topics vary.  
Credit Hours: 1-6  
Min credits per semester: 1  
Max credits per semester: 6  
Max credits per degree: 6  
Format: IND  

AGEN 499H Honors Thesis  
Prerequisites: Senior or junior standing, admission to the University Honors Program.  
Description: Independent project which meets the requirements of the University Honors Program, conducted under the guidance of a faculty member in the Department of Biological Systems Engineering. The project should contribute to the advancement of knowledge in the field. Written thesis and formal presentation required.  
Credit Hours: 1-6  
Min credits per semester: 1  
Max credits per semester: 6  
Max credits per degree: 6  
Format: IND  

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.  

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  
• Associate Engineer, Altec Industries - St. Jospeh MO  
• Natural Resources Technician Intern, Middle Niobrara Natural Resources District - Valentine NE  
• Engineering Development Program-Product Engineer, John Deere - Cedar Falls IL  
• Grain Terminal Operations, Archer Daniels Midland - Decatur IL  
• Business Solutions Consultant, Lindsay Corporation - Omaha NE  
• More...  
  • Production Supervisor, Cargill - Holdrege, NE NE  
  • Project Engineer, Lincoln Industries - Lincoln NE  
  • FieldNET Water Management Support, Lindsay Corporation - Omaha NE  
  • Design Engineer, Kuhn Krause - Hutchinson KS  
  • Water Resources Project Engineer, JEO Consulting Group - Lincoln NE  

Internships  
• Biological Research Assistant, USDA - Lincoln NE  
• Drivetrain Product Engineering Intern, John Deere - Waterloo IA  
• Agricultural Engineering Co-op, Altec - St. Joseph MO  
• RD Engineering Intern, Global Industries - Grand Island NE  
• Field Test Technician, Claas of America - Omaha NE  
• More...  
  • Agricultural Engineering Intern, UNL Department of Animal Science - Lincoln NE  
  • Design Engineering Intern, AGCO Corporation - Hesston KS  
  • Engineering Intern, Cargill - Beardstown IL  
  • Environmental Engineering Intern, Nucor Steel - Norfolk NE  
  • Combine Header Platform Intern, CNH Industrial - New Holland PA  

Grad Schools  
• Masters of Science in Agricultural and Bio Systems Engineering, University of Nebraska-Lincoln - Lincoln NE  
• Masters of Science, University of Nebraska-Lincoln - Lincoln NE