PLANT BIOLOGY (CASNR)

Description
Website: http://agronomy.unl.edu/plantbiology

The plant biology degree program provides flexible entry for undergraduate students that have an interest in the plant sciences. Once enrolled in the program, students will take a core of classes that will allow them to continue in the plant biology degree program or allow them to easily transfer to other Life Sciences programs. Students will have the opportunity to interact with the faculty of the Center for Plant Science Innovation as well as the above departments and schools for advising, internships and research opportunities.

Studying plant biology will allow students to explore their knowledge of plants at the:

1. molecular (biotechnology option),
2. cellular and organismal (biological, biochemical/chemical sciences),
3. whole plant/applied physiological (horticulture and agronomy courses), and
4. ecological levels (ecology and management option).

Students may select a bachelor of science track through the College of Agricultural Sciences and Natural Resources or a bachelor of science or arts track through the College of Arts and Sciences. Every student must complete a set of core courses that provide breadth in basic sciences. Introduction to plant biology should be taken during the first semester in the program. Students also must complete an emphasis to provide depth in one of the following options: Biotechnology or Ecology and Management.

The plant biology program includes a career experience/internship course (AGRO 295/RNGE 295/SOIL 295; BIOS 395; HORT 395/TLMT 395; NRES 497) which provides the opportunity to gain work experience in an off-campus setting related to a students academic and career objectives.

A research project initiated by the beginning of the junior year is required. Presentation of this work will be part of the Plant Biology Portfolio and Assessment course.

Students interested in plant biology through the College of Agricultural Sciences and Natural Resources are advised to make an initial appointment with the chief academic advisor, Dr. Don Lee, who will then assign them to a faculty member in the College of Agricultural Sciences and Natural Resources.

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 studies, and 2 units of foreign language. Students must also meet performance requirements (ACT composite of 20 or higher OR combined SAT score of 950 or higher 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. For students entering the PGA Golf Management degree program, a certified golf handicap of 12 or better (e.g., USGA handicap card) or written ability (MS Word file) equivalent to a 12 or better handicap by a PGA professional or high school golf coach is required. For more information, please visit: http://pgm.unl.edu/requirements.

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 UNL, or within the first calendar year at UNL, whichever takes longer, excluding foreign languages. Students have up to 60 credit hours to remove foreign language deficiencies. College-level course work taken to remove deficiencies may be used to meet degree requirements in CASNR.

Deficiencies in the required entrance subjects can be removed by 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 insures that a student will meet the minimum curriculum requirements of the College.

Foreign Languages-Language Requirement

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

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.

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 (withdrawn), 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.

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.

**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 is the maximum number of hours UNL will accept on transfer from a two-year college. Ninety is the maximum number of hours UNL 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 UNL 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 UNL.

**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 requirements for a bachelor of science degree in CASNR. Cooperative programs result in a single degree from either UNL 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 course work. 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 UNL, 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
- 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 UNL 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 complete the “Application for Degree” form and provide transcripts to the Credentials Clerk, Office of the University Registrar, 107 Canfield Administration Building, UNL. Students should discuss these degree programs with their academic advisor.

**Cooperative Degree Programs**

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

**UNL Degree-Granting Programs**

A UNL 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.

**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**. The University of Nebraska at Omaha (UNO) cooperates with CASNR in providing four-semester pre-agricultural sciences, pre-natural resources, pre-food science and technology, pre-horticulture and pre-turfgrass and landscape management transfer programs.

A student enrolled in these programs may transfer all satisfactorily completed academic credits identified in the suggested program of study, and enter CASNR to study toward a degree program leading to a bachelor of science degree. The total program would require a minimum of four years or eight semesters (16 credit hours/semester or 120 credit hours).

UNL CASNR faculty teach horticulture and food science and technology courses at UNO to assist an urban population in better understanding the food processing, horticulture, and landscape horticulture industries.

For more information, contact the CASNR Dean's Office, 800-472-8800, ext. 2541.
Non UNL Degree-Granting Programs
The CASNR cooperates with other institutions to provide course work 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 UNL 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 course work at Chadron State College and one year of specialized range science course work (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 UNL credits. At least 18 of the 30 credit hours must be in courses offered through CASNR\(^1\) (≥299) including the appropriate ACE 10 degree requirement or an approved ACE 10 substitution offered through another UNL 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 UNL and participate in prior-approved education abroad programs. UNL open enrollment and summer independent study courses count toward residence.

\(^{1}\) 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 course work under 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 www.ace.unl.

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 UNL or when they were first admitted to a Joint Academic Transfer Program. 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 UNL 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
Majors in plant biology will be able to:

1. Be confident in explaining how various plants grow and reproduce and predict how they will respond to their growing environment.
2. Plan and conduct experiments that are designed to test hypotheses and then communicate their discoveries in formats designed for other scientists or for the public.
3. Use the principles of ecology to analyze and interpret the interactions of the plant, animal, environmental, and economic aspects of grassland ecosystems. (Ecology and Management Option)
4. Identify management strategies for grasslands that ensure sustained productivity and resilience. (Ecology and Management Option)
5. Envision and design genetic and production improvements in plants to better meet the needs of people or changes in plant production environments (Biotechnology Option)
6. Be competitive applicants for graduate programs world wide in plant biology.

Major Requirements
The core requirements and one of the options must be completed.

Core Requirements

<table>
<thead>
<tr>
<th>Core Requirements</th>
<th>Hours</th>
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<tbody>
<tr>
<td>SCIL 101 Science and Decision-Making for a</td>
<td>3</td>
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<tr>
<td>Complex World</td>
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Career Experience
Select one of the following:

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<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Course Code</td>
<td>Course Title</td>
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<tr>
<td>------------------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>AGRO 295</td>
<td>Internship in Agronomy</td>
</tr>
<tr>
<td>RNGE 295</td>
<td></td>
</tr>
<tr>
<td>SOIL 295</td>
<td></td>
</tr>
<tr>
<td>BIOS 395</td>
<td>Internship</td>
</tr>
<tr>
<td>HORT 395</td>
<td>Career Experience</td>
</tr>
<tr>
<td>TLMT 395</td>
<td></td>
</tr>
<tr>
<td>NRES 497</td>
<td>Career Experiences in Natural Resource Sciences</td>
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</table>

**Independent Study/Current Project**

Select one of the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGRO 496</td>
<td>Independent Study</td>
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</tr>
<tr>
<td>RNGE 496</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SOIL 496</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOS 498</td>
<td>Independent Research in Biological Sciences</td>
<td></td>
</tr>
<tr>
<td>HORT 396</td>
<td>Current Projects and Topics in Horticulture</td>
<td></td>
</tr>
<tr>
<td>or HORT 399</td>
<td>Independent Study</td>
<td></td>
</tr>
<tr>
<td>NRES 496</td>
<td>Independent Study</td>
<td></td>
</tr>
<tr>
<td>PLPT 496</td>
<td>Independent Study</td>
<td></td>
</tr>
<tr>
<td>AGRO 92</td>
<td>Plant Biology Portfolio and Assessment</td>
<td>0</td>
</tr>
<tr>
<td>HORT 92</td>
<td></td>
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<tr>
<td>NRES 92</td>
<td></td>
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**Credit Hours Subtotal:**

<table>
<thead>
<tr>
<th>Mathematical and Statistics (ACE 3)</th>
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<tbody>
<tr>
<td>MATH 106: Calculus I</td>
</tr>
<tr>
<td>STAT 218: Introduction to Statistics</td>
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**Credit Hours Subtotal:**

<table>
<thead>
<tr>
<th>Communications</th>
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<tbody>
<tr>
<td>Written Communication (ACE 1)</td>
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Select one of the following:

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<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>ENGL 150</td>
<td>Writing and Inquiry</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 151</td>
<td>Writing and Argument</td>
<td></td>
</tr>
<tr>
<td>ENGL 254</td>
<td>Writing and Communities</td>
<td></td>
</tr>
<tr>
<td>JGEN 120</td>
<td>Basic Business Communication</td>
<td></td>
</tr>
<tr>
<td>JGEN 200</td>
<td>Technical Communication I</td>
<td></td>
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<tr>
<td>JGEN 300</td>
<td>Technical Communication II</td>
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<th>Oral Communication (ACE 2)</th>
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<td>Select one of the following:</td>
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<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>COMM 109</td>
<td>Fundamentals of Human Communication</td>
<td>3</td>
</tr>
<tr>
<td>COMM 209</td>
<td>Public Speaking</td>
<td></td>
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<tr>
<td>COMM 286</td>
<td>Business and Professional Communication</td>
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**Credit Hours Subtotal:**

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<thead>
<tr>
<th>Natural Sciences</th>
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<tbody>
<tr>
<td>AGRO 153</td>
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<tr>
<td>HORT 153</td>
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<tr>
<td>SOIL 153</td>
</tr>
<tr>
<td>BIOC 321</td>
</tr>
<tr>
<td>&amp; BIOC 321L</td>
</tr>
<tr>
<td>CHEM 109</td>
</tr>
<tr>
<td>CHEM 110</td>
</tr>
<tr>
<td>CHEM 251</td>
</tr>
<tr>
<td>&amp; CHEM 253</td>
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<tr>
<td>PHYS 141</td>
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**Credit Hours Subtotal:**

<table>
<thead>
<tr>
<th>Biological Sciences</th>
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<tbody>
<tr>
<td>AGRO 215</td>
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<tr>
<td>HORT 215</td>
</tr>
<tr>
<td>TLMT 215</td>
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<td>AGRO 325</td>
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Select one of the following:

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<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>BIOS 109</td>
<td>General Botany</td>
<td>4</td>
</tr>
<tr>
<td>AGRO 131</td>
<td>Plant Science</td>
<td></td>
</tr>
<tr>
<td>HORT 131</td>
<td>and Agronomic Plant Science Laboratory</td>
<td></td>
</tr>
<tr>
<td>&amp; AGRO 132</td>
<td>or HORT 133 Horticultural Plant Science Laboratory</td>
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Select one of the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>BIOS 207</td>
<td>Ecology and Evolution</td>
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<tr>
<td>BIOS 220</td>
<td>Principles of Ecology</td>
<td></td>
</tr>
<tr>
<td>NRES 220</td>
<td>and Ecology Laboratory</td>
<td></td>
</tr>
<tr>
<td>&amp; BIOS 222</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LIFE 120</td>
<td>Fundamentals of Biology I</td>
<td>4</td>
</tr>
<tr>
<td>&amp; LIFE 120L</td>
<td>and Fundamentals of Biology I laboratory</td>
<td></td>
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<tr>
<td>LIFE 121</td>
<td>Fundamentals of Biology II</td>
<td>4</td>
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<tr>
<td>&amp; LIFE 121L</td>
<td>and Fundamentals of Biology II laboratory</td>
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<tr>
<th>Economics, Humanities and Social Sciences</th>
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<tbody>
<tr>
<td>ECON 211: Principles of Macroeconomics (ACE 6)</td>
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<tr>
<td>or ECON 212: Principles of Microeconomics</td>
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Select one course each from ACE outcomes 5, 7, 8, and 9

**Credit Hours Subtotal:**

<table>
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<tr>
<th>Option Requirements</th>
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<tr>
<td>Complete requirements</td>
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**Credit Hours Subtotal:**

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<tr>
<th>EcoLogy and Management Option</th>
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<tbody>
<tr>
<td>Within this option one course must be taken to fulfill the ACE 10 outcome. Suggested courses are:</td>
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<thead>
<tr>
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<th>Course Title</th>
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<tbody>
<tr>
<td>AGRO 403</td>
<td>Scientific Writing and Communication</td>
<td>3</td>
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<tr>
<td>HORT 403</td>
<td></td>
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<tr>
<td>BIOS 454</td>
<td>Ecological Interactions</td>
<td>3</td>
</tr>
<tr>
<td>NRES 454</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOS 457</td>
<td>Ecosystem Ecology</td>
<td>4</td>
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**Courses**

Select one of the following:

<table>
<thead>
<tr>
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<th>Course Title</th>
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<tbody>
<tr>
<td>AGRO 245</td>
<td>Introduction to Grassland Ecology and Management</td>
<td></td>
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<tr>
<td>NRES 245</td>
<td></td>
<td></td>
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<tr>
<td>NRES 310</td>
<td>Introduction to Forest Management</td>
<td></td>
</tr>
<tr>
<td>AGRO 444</td>
<td>Ecosystem Monitoring and Assessment</td>
<td>3</td>
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<tr>
<td>NRES 444</td>
<td></td>
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<tr>
<td>RNGE 444</td>
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**Credit Hours Subtotal:**

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<tr>
<th>Earth Sciences</th>
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<td>Water/Climate</td>
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Select one of the following:

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<th>Course Title</th>
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<td>METR 100</td>
<td>Weather and Climate</td>
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<th>Total Credit Hours</th>
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<td>120</td>
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<tr>
<td>NRES 208</td>
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<tr>
<td>NRES 408 /</td>
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<td>AGRO 408 /</td>
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<tr>
<td>GEOG 408 /</td>
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<tr>
<td>HORT 408 /</td>
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<tr>
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<td>WATS 408</td>
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<td>WATS 281 /</td>
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<td>GEOG 281 /</td>
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<td>NRES 281</td>
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<td>BIOS 470</td>
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</tr>
<tr>
<td>NRES 468 /</td>
</tr>
<tr>
<td>BIOS 458 /</td>
</tr>
<tr>
<td>WATS 468</td>
</tr>
</tbody>
</table>

Credit Hours Subtotal: 7-8

**Electives**

Select 7-12 credits

Credit Hours Subtotal: 7-12

Total Credit Hours 32-42

### Biotechnology Option

Within this option one course must be taken to fulfill the ACE 10 outcome. Suggested courses are:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGRO 403 /</td>
<td>Scientific Writing and Communication</td>
</tr>
<tr>
<td>HORT 403</td>
<td></td>
</tr>
<tr>
<td>BIOS 454 /</td>
<td>Ecological Interactions</td>
</tr>
<tr>
<td>NRES 454</td>
<td></td>
</tr>
<tr>
<td>BIOS 457</td>
<td>Ecosystem Ecology</td>
</tr>
</tbody>
</table>

**Courses**

Select one of the following: 3-4

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOS 312</td>
<td>Microbiology</td>
</tr>
<tr>
<td>BIOS 237</td>
<td>Basic Applications of Bioinformatics</td>
</tr>
<tr>
<td>BIOS 442 /</td>
<td>Computational Biology</td>
</tr>
<tr>
<td>STAT 442</td>
<td></td>
</tr>
<tr>
<td>BIOS 427</td>
<td>Practical Bioinformatics Laboratory</td>
</tr>
<tr>
<td>BIOS 478</td>
<td>Plant Anatomy</td>
</tr>
</tbody>
</table>

Select at least 3 credits from each of the three categories below for a total of 17 hours or more:

**Biological Sciences**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGRO 270 /</td>
<td>Biological Invaders</td>
</tr>
<tr>
<td>HORT 270 /</td>
<td></td>
</tr>
<tr>
<td>NRES 270 /</td>
<td></td>
</tr>
<tr>
<td>PLPT 270</td>
<td></td>
</tr>
<tr>
<td>AGRO 460 /</td>
<td>Soil Microbiology</td>
</tr>
<tr>
<td>BIOS 447 /</td>
<td></td>
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<tr>
<td>NRES 460 /</td>
<td></td>
</tr>
<tr>
<td>SOIL 460</td>
<td></td>
</tr>
<tr>
<td>BIOS 205</td>
<td>Genetics, Molecular and Cellular Biology Laboratory</td>
</tr>
<tr>
<td>BIOS 302</td>
<td>Cell Biology</td>
</tr>
<tr>
<td>BIOS 317</td>
<td>The Biology of Plants</td>
</tr>
<tr>
<td>BIOS 407</td>
<td>Biology of Cells and Organelles</td>
</tr>
<tr>
<td>BIOS 418</td>
<td>Advanced Genetics</td>
</tr>
<tr>
<td>BIOS 420 /</td>
<td>Molecular Genetics</td>
</tr>
<tr>
<td>MBIO 420</td>
<td></td>
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<tr>
<td>BIOS 425</td>
<td>Plant Biotechnology</td>
</tr>
<tr>
<td>BIOS 471</td>
<td>Plant Systematics</td>
</tr>
<tr>
<td>Course Code</td>
<td>Course Title</td>
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<td>-------------</td>
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</tr>
<tr>
<td>BIOS 477</td>
<td>Bioinformatics and Molecular Evolution</td>
</tr>
<tr>
<td>AGRO 131, HORT 131, &amp; AGRO 132</td>
<td>Plant Science and Agronomic Plant Science Laboratory</td>
</tr>
<tr>
<td>AGRO 133, HORT 133</td>
<td>Horticultural Plant Science Laboratory</td>
</tr>
<tr>
<td>AGRO 408, GEOG 408, HORT 408, METR 408, NRES 408, WATS 408</td>
<td>Microclimate: The Biological Environment</td>
</tr>
<tr>
<td>AGRO 411</td>
<td>Crop Genetic Engineering</td>
</tr>
<tr>
<td>AGRO 412</td>
<td>Crop and Weed Genetics</td>
</tr>
<tr>
<td>HORT 221</td>
<td>Plant Propagation</td>
</tr>
<tr>
<td>NRES 406, HORT 406, AGRO 406</td>
<td>Plant Ecophysiology: Theory and Practice</td>
</tr>
<tr>
<td>PLPT 369, BIOS 369</td>
<td>Introductory Plant Pathology</td>
</tr>
<tr>
<td>AGRO 204</td>
<td>Resource-Efficient Crop Management</td>
</tr>
<tr>
<td>AGRO 240, RNGE 240</td>
<td>Forage Crop and Pasture Management</td>
</tr>
<tr>
<td>AGRO 227, HORT 227, PGAM 227, TLMT 227</td>
<td>Introductory Turfgrass Management</td>
</tr>
<tr>
<td>AGRO 405</td>
<td>Crop Management Strategies (ACE 10)</td>
</tr>
<tr>
<td>or AGRO 435, AGRO 439</td>
<td>Agroecology</td>
</tr>
<tr>
<td>HORT 435, NRES 435</td>
<td></td>
</tr>
<tr>
<td>AGRO 426, HORT 426, NRES 426</td>
<td>Invasive Plants</td>
</tr>
<tr>
<td>AGRO 437</td>
<td>Animal, Food and Industrial Uses of Grain</td>
</tr>
<tr>
<td>AGRO 438</td>
<td>Producing Grain for Animal, Food and Industrial Uses</td>
</tr>
<tr>
<td>ENTO 115, BIOS 115, &amp; ENTO 116</td>
<td>Insect Biology and Insect Identification</td>
</tr>
<tr>
<td>FDST 205</td>
<td>Food Composition and Analysis</td>
</tr>
<tr>
<td>HORT 325</td>
<td>Greenhouse Practices and Management</td>
</tr>
<tr>
<td>HORT 352</td>
<td>Production and Physiology of Horticultural Crops</td>
</tr>
<tr>
<td>HORT 355</td>
<td>Perennial, Pot and Bedding Plant Production Laboratory</td>
</tr>
<tr>
<td>HORT 462</td>
<td>Nursery Management and Crop Production (ACE 10)</td>
</tr>
</tbody>
</table>

Credit Hours Subtotal: 27-28

**Electives**

Select 10 credits

Credit Hours Subtotal: 10

Total Credit Hours 37-38

### Additional Major Requirements

#### Grade Rules

**Pass/No Pass**

Students in plant biology may not take any of the core or option courses required for the degree Pass/No Pass except for the Exploring Plant Biology and Career Experience courses.

#### Program Assessment.

To gauge the effectiveness of this program, students will be required to start and maintain an experiential portfolio throughout their program, culminating with a presentation of their research in the Introduction to Plant Biology course.

### Requirement for Minor Offered by Department

Requirements for the minor include a minimum of 19 hours of course work with a minimum of 7 hours at the 300 level or above.

### Requirements

Select one of the following:

- AGRO 131, HORT 131, & AGRO 132, HORT 133
- AGRO 131, HORT 131, & HORT 133, AGRO 132
- AGRO 325, Introductory Plant Physiology
- BIOS 109, General Botany

Select one focus of the following:

**Biotechnology Focus**
- AGRO 215, HORT 215, TLMT 215

Select any 300- or 400-level course listed under the Plant Biology Major-Biotechnology Option

**Ecology and Management Focus**
- BIOS 220, Principles of Ecology
- NRES 220, Ecology Laboratory
- & BIOS 222, NRES 222

Select any 300- or 400-level course listed under the Plant Biology Major-Ecology & Management Option

Credit Hours Subtotal: 19

Total Credit Hours 19
AGRO 107 Invasive Plant Species: Impacts on Ecosystems
Crosslisted with: NRES 107
Description: The flora of the earth is constantly being re-distributed by natural and human forces. As plant species change locations, they affect ecosystems, but how? In this course, students will learn how invasive plants establish and spread in ecosystems and develop an understanding of the importance of invasive plants and their impacts on ecosystems from local to global scales.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
ACE: ACE 9 Global/Diversity

AGRO 127 Survey of Turfgrass and Landscape Management
Crosslisted with: TLMT 127, HORT 127
Description: Introduction to careers, internships and co-curricular activities in turfgrass and landscape management.
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 1
Format: LEC

AGRO 131 Plant Science
Crosslisted with: HORT 131
Description: Biology of plants grown for food, fiber, fun, or fuel. Plant life cycles in managed ecosystems and their role in global carbon and water cycles. Mechanisms plants use to drive and control their growth, propagate, and change to compete with other organisms in their environment.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

AGRO 132 Agronomic Plant Science Laboratory
Prerequisites: AGRO 131 or parallel
Description: Growth, development, morphology and staging of annual and perennial monocot and dicot plants produced for grain, forage and grazing. Evaluation of seed, grain and forage quality for plants of agronomic importance.
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 1
Format: LAB

AGRO 153 Soil Resources
Crosslisted with: HORT 153, SOIL 153
Prerequisites: High school chemistry or one semester college chemistry.
Description: Characteristics of soils in relation to their appropriate uses and protection. Principles and practices using cooperative exercises including discussion, assessment, planning, problem-solving, writing, and presentation involving all aspects of soils.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Format: LEC
Prerequisite for: AGRO 327, HORT 327, TLMT 327; AGRO 361, GEOL 361, NRES 361, SOIL 361, WATS 361; AGRO 455, AGRO 855, NRES 455, NRES 855, SOIL 455; AGRO 472, AGRO 872, NRES 472, NRES 872, SOIL 472, WATS 472; NRES 245, AGRO 245; NRES 319

AGRO 201 Agronomic Internship and Career Preparation
Description: Group activities to help formulate career goals, improve academic success skills, develop a resume and select an appropriate internship.
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 1
Format: LEC

AGRO 204 Resource-Efficient Crop Management
Prerequisites: AGRO 131 and AGRO/SOIL 153, or equivalents.
Description: Integration of principles of crop and soil science, plant breeding, climatology and integrated pest management in the development and evaluation of crop management practices. Efficient use of solar radiation, water, nutrients, heat, carbon dioxide, and other resources in field crop management.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Prerequisite for: AGRO 405

AGRO 215 Genetics
Crosslisted with: HORT 215, TLMT 215
Prerequisites: 3 hrs biological sciences.
Description: Discovery of the biology of genes and the application of genetics principles to understand the control and inheritance of traits in families and populations. Focus is on animals and plants that are important in medicine, agriculture and nature. Learning emphasis is problem solving via online, instant feedback assessments, group discussion, experimental data analysis and context-based exams.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Format: LEC
Prerequisite for: ASCI 330
AGRO 216 Plant Breeding Principles and Practice
Crosslisted with: BIOS 216, HORT 216
Prerequisites: High school biology and chemistry. BIOS 101 and 101L, or 102 or equivalent recommended.
Description: Plant breeding theory and technique. Application of genetic principles to plant improvement. Experience with breeding agronomic and horticultural plant species to illustrate plant mating systems and breeding principles.
Credit Hours: 2
Max credits per semester: 2
Max credits per degree: 2
Format: LEC

AGRO 227 Introductory Turfgrass Management
Crosslisted with: HORT 227, PGAM 227, TLMT 227
Prerequisites: AGRO 131 or HORT 130 or BIOS 109.
Description: Introduction to turfgrasses, their management and use, and to the turfgrass industry.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Prerequisite for: AGRO 326, HORT 326, TLMT 326; AGRO 327, HORT 327, TLMT 327

AGRO 228 Introduction to Landscape Management
Crosslisted with: HORT 228, TLMT 228
Prerequisites: AGRO 131 or BIOS 109
Notes: TLMT/AGRO/HORT uses a team approach to problem solving, discussion, assessment planning, and oral presentations of applied case studies.
Description: An overview of landscape management and landscape design. Principles and practices.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Prerequisite for: AGRO 326, HORT 326, TLMT 326

AGRO 229 Introductory Turfgrass Management Laboratory
Crosslisted with: TLMT 229, HORT 229
Description: Laboratory covering turfgrass identification and management. Concurrent enrollment with AGRO/HORT/TLMT 227 preferred. Required for Turfgrass Science majors, other students require instructor consent.
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 1
Format: LAB

AGRO 240 Forage Crop and Pasture Management
Crosslisted with: RNGE 240
Prerequisites: AGRO 131 or BIOS 109 or equivalent
Description: Principles basic to the establishment, management, and utilization of forage crops and pastures. Plant identification and selection, seedling, fertilization, irrigation, forage quality and utilization, hay and silage preservation, and grazing management. The role of forages and ranges in developing a sustainable agriculture.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

AGRO 242 North American Wildland Plants
Crosslisted with: HORT 242, RNGE 242
Prerequisites: Permission, AGRO/RNGE 240 recommended.
Description: Identification and description of two-hundred important wildland plants of North America. Characteristics of these plants evaluated in terms of management implications.
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 4
Format: LEC

AGRO 245 Introduction to Grassland Ecology and Management
Crosslisted with: NRES 245
Prerequisites: AGRO 153
Description: Grassland ecology and management is relevant to students with education and career goals in managing natural resources in Nebraska and the Great Plains. About 50% of the land area in Nebraska is classified as grassland (or rangeland) and is the land type with the most opportunity for enhancing biodiversity and wildlife habitat. Applying ecological principles and social values to managing rangeland resources, students will develop a knowledge and appreciation for the various grassland management uses and techniques available to resource managers.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

AGRO 269 Principles of Soil Management
Crosslisted with: SOIL 269
Prerequisites: AGRO 153.
Description: Principles of soil management under dryland and irrigated conditions. Relationships of soil and climate resources to soil erosion, movement and storage of soil water, soil organic matter, and irrigation practice. Special problem topics such as acidity, alkali, drainage, and soil testing.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

AGRO 270 Biological Invaders
Crosslisted with: HORT 270, NRES 270, PLPT 270
Prerequisites: 3 hrs biological sciences.
Description: Impact of exotic species and invasive organisms: agricultural and medical emerging disease; predicting biological invasions; biological control; regulatory, monitoring, and control efforts; ecological impact.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

AGRO 275 Agribusiness Entrepreneurial Finance
Crosslisted with: AECN 275, EAEP 275, ENTR 275, HORT 275
Description: Overview of financial issues for agribusiness start-ups. Business funding specific to new enterprises. Case studies on financial practices for start-up firms.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
AGRO 279 Soil Evaluation  
Crosslisted with: NRES 279, SOIL 279  
Credit Hours: 1  
Max credits per semester: 1  
Max credits per degree: 3  
Format: LEC

AGRO 295 Internship in Agronomy  
Crosslisted with: RNGE 295, SOIL 295  
Prerequisites: Sophomore standing and completion of internship approval form. The internship proposal is subject to approval by the department.  
Description: Participation in agronomic applications and in agronomy-related areas of agribusiness; agronomic research in lab, greenhouse, or field; participation in farming practices other than those in which the student has had previous experience; or preparation of teaching materials.  
Credit Hours: 1-3  
Min credits per semester: 1  
Max credits per semester: 3  
Max credits per degree: 5  
Format: LEC

AGRO 325 Introductory Plant Physiology  
Prerequisites: Chemistry through organic or higher-level course in cell biology.  
Notes: Botany recommended.  
Credit Hours: 4  
Max credits per semester: 4  
Max credits per degree: 4  
Format: LEC

AGRO 326 Landscape Solutions  
Crosslisted with: HORT 326, TLMT 326  
Prerequisites: TLMT/AGRO/HORT 227 or 228  
Description: Using processes and problem-solving approach to identify and analyze common landscape management situations in commercial, public, and residential landscapes. Integrate design, environment, function, pest and disease, and existing management practices to produce recommendations.  
Credit Hours: 3  
Max credits per semester: 3  
Max credits per degree: 3  
Format: LEC

AGRO 327 Turfgrass Science and Management  
Crosslisted with: HORT 327, TLMT 327  
Prerequisites: AGRO/HORT/SOIL 153; CHEM 105 or 109; and TLMT 227  
Description: Scientific principles of turf species adaptation, turf and/or soil relationships, establishment, fertility, mowing, irrigation, and pest control of turf species.  
Credit Hours: 3  
Max credits per semester: 3  
Max credits per degree: 3  
Format: LEC

AGRO 330 Pruning Ornamentals  
Crosslisted with: HORT 330, TLMT 330  
Description: Why, when and how to prune ornamental landscape plants. Demonstrations and field opportunities on how to choose and how to use pruning tools correctly.  
Credit Hours: 1  
Max credits per semester: 1  
Max credits per degree: 1  
Format: LEC

AGRO 340 Range Management and Improvement  
Crosslisted with: RNGE 340  
Prerequisites: AGRO 240.  
Description: The principles of range management within the ecosystem framework. Range improvement practices and grazing systems; plant control using biological, chemical and mechanical factors; prescribed burning; range seeding; range fertilization; and the integration of range with other forage resources.  
Credit Hours: 3  
Max credits per semester: 3  
Max credits per degree: 3  
Format: LEC

AGRO 361 Soils, Environment and Water Quality  
Crosslisted with: GEOL 361, NRES 361, SOIL 361, WATS 361  
Prerequisites: AGRO/HORT/SOIL 153; MATH 102 or 103; two semesters chemistry (CHEM 105, 106 or CHEM 109,110) and WATS/GEOG/NRES 281  
Description: Chemical and physical processes that influence the fate and transport of contaminants (inorganic, organic, microbial) in soil-water environments. Extent, fate, mitigation and impact of various sources of pollution. Remedial technologies used for environmental restoration of contaminated environments.  
Credit Hours: 3  
Max credits per semester: 3  
Max credits per degree: 3  
Format: LEC

AGRO 366 Soil Nutrient Relationships  
Crosslisted with: SOIL 366  
Prerequisites: AGRO 153.  
Description: Use of fertilizers as plant nutrient sources to produce healthy and nutritious plants, improve profit, insure enterprise sustainability, fulfill legal requirements, and protect soil and water quality. Addresses issues from production agriculture, natural resource utilization and preservation, and ornamental plant culture.  
Credit Hours: 4  
Max credits per semester: 4  
Max credits per degree: 4  
Format: LEC

AGRO 370 Biology of Fungi  
Crosslisted with: HORT 370, PLPT 370  
Prerequisites: 8 hrs biological sciences.  
Description: Survey of fungi in natural and human ecosystems: symbiotic relationships; as disease agents in humans, animals, and plants; applications in food, agricultural, and pharmaceutical industries; historical and current impacts on society.  
Credit Hours: 3  
Max credits per semester: 3  
Max credits per degree: 3  
Format: LEC

AGRO 388 Agribusiness Entrepreneurship  
Crosslisted with: HORT 388, ENTR 388, EAEP 388, ABUS 388  
Description: Overview of types of agricultural enterprises. Basic accounting principles as they relate to agricultural businesses. Requires completion of a marketing plan specific to agricultural enterprises based on a business idea. Student team projects with emphasis on marketing.  
Credit Hours: 3  
Max credits per semester: 3  
Max credits per degree: 3  
Format: LEC  
Prerequisite for: HORT 301
AGRO 403 Scientific Writing and Communication
Crosslisted with: AGRO 803, HORT 403, HORT 803
Prerequisites: Senior standing or higher, an ACE 1 written communication course, an ACE 2 oral communication course, and permission of instructor.
Description: Reading and critiquing, writing, and presenting scientific information. Use research data to compose a manuscript in standard scientific format, and prepare and present a poster to a general audience. Ethical issues in research and writing.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
ACE: ACE 10 Integrated Product

AGRO 405 Crop Management Strategies
Prerequisites: Senior standing; AGRO 204, AGRO/SOIL 269; and permission. JGEN 200 and/or 300, and AECN 201 recommended
Notes: Capstone course. Requires participation in a three-day field trip prior to the beginning of the first semester. Students must notify instructor at time of early registration (dates are listed in Schedule of Classes). Cannot be taken "Pass/No Pass."
Description: Application, expansion, and integration of principles from agricultural, biological, and physical sciences into the development and management of cropping systems.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
ACE: ACE 10 Integrated Product

AGRO 406 Plant Ecophysiology: Theory and Practice
Crosslisted with: AGRO 806, HORT 406, HORT 806, NRES 406, NRES 806
Prerequisites: Junior standing; 4 hrs ecology; and 4 hrs botany or plant physiology
Description: Principles of plant physiology which underlie the relationship between plants and their physical, chemical and biotic environments. An introduction to the ecological niche, limiting factors and adaptation. An overview of the seed germination and ecology, plant and soil water relations, nutrients, plant energy budgets, photosynthesis, carbon balance and plant-animal interactions. An introduction to various field equipment used in ecophysiological studies.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Format: LEC

AGRO 408 Microclimate: The Biological Environment
Crosslisted with: GEOG 408, HORT 408, METR 408, NRES 408, WATS 408, AGRO 808, GEOG 808, HORT 808, METR 808, NRES 808
Prerequisites: Junior standing, MATH 106 or equivalent, 5 hrs physics, major in any of the physical or biological sciences or engineering; or permission.
Description: Physical factors that create the biological environment. Radiation and energy balances of earth's surfaces, terrestrial and marine. Temperature, humidity, and wind regimes near the surface. Control of the physical environment through irrigation, windbreaks, frost protection, manipulation of light, and radiation. Applications to air pollution research. Instruments for measuring environmental conditions and remote sensing of the environment.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

AGRO 409A Case studies in plant breeding: Breeding for Disease Resistance
Crosslisted with: AGRO 809A, HORT 409A, HORT 809A
Description: The application of fundamental genetics principles in inheritance, gene mapping and DNA analysis to decision making by plant breeders with the goal of improving disease resistance in crop cultivars. Learning is structured by the genetics discovery story told in published research articles and the thinking process of plant breeders who will use these discoveries in their work.
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 1
Format: LEC

AGRO 409B Case Studies in plant breeding: Transgenic strategies for disease resistance
Crosslisted with: AGRO 809B, HORT 409B, HORT 809B
Description: The application of basic science and technology by plant genetic engineering experts with the goal of teaming with plant breeders to improve disease resistance in crop cultivars. Learning is structured by the genetics discovery story told in published research articles and the thinking process of genetic engineers and plant breeders who will use these discoveries in their work.
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 1
Format: LEC

AGRO 411 Crop Genetic Engineering
Crosslisted with: AGRO 811
Description: Basic steps required to produce genetically engineered crops. Genetic engineering procedures used to develop current crops and innovations that will lead to future products. Genetic engineering process and predicting how changes in different steps of the process influence the final crop. Application of genetic engineering technology to plan the development of new genetically engineered crops.
Credit Hours: 2
Max credits per semester: 2
Max credits per degree: 2
Format: LEC
AGRO 412 Crop and Weed Genetics
Crosslisted with: AGRO 812
Notes: A previous class in Genetics is highly recommended.
Description: Application of classical and molecular genetic principles to the explanation of variation observed in plant families and populations. Interpretation of information gathered from whole plant trait observation and from molecular analysis. Relationships between crops and weeds. Examples from genetic studies on both crop and weed species are the basis of course.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Offered: SPRING

AGRO 414 Turfgrass Disease Management
Crosslisted with: AGRO 814, HORT 414, HORT 814, PLPT 414, PLPT 814, TLMT 414, TLMT 814
Prerequisites: BIOS/PLPT 369 or one semester of introductory plant pathology.
Description: Pathogens, epidemiology, and control of diseases specific to turfgrass.
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 1
Format: LEC

AGRO 419 Applications of Remote Sensing in Agriculture and Natural Resources
Crosslisted with: GEOG 419, GEOL 419, NRES 420, AGRO 819, GEOG 819, GEOL 819, NRES 820
Prerequisites: GEOG/NRES 418.
Description: Introduction to the practical uses of remote electromagnetic sensing in dealing with agricultural and water-resources issues.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Format: LEC
Groups: Techniques

AGRO 426 Invasive Plants
Crosslisted with: AGRO 826, HORT 426, HORT 826, NRES 426, NRES 826
Prerequisites: AGRO/HORT/SOIL 153; BIOS 109.
Description: Identification, biology and ecology of weedy and invasive plants. Principles of invasive plant management by preventative, cultural, biological, mechanical and chemical means using an adaptive management framework. Herbicide terminology and classification, plant-herbicide and soil-herbicide interactions, equipment calibration and dosage calculations.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

AGRO 427 Turfgrass Systems Management
Crosslisted with: HORT 427, TLMT 427, AGRO 827, HORT 827, TLMT 827
Prerequisites: TLMT 227 and TLMT 327
Description: Critical evaluation of turfgrass settings to create economical and environmentally friendly management systems for professionally managed turf areas.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
ACE: ACE 10 Integrated Product

AGRO 429A Food Security: A Global Perspective
Prerequisites: Junior standing
Description: Overview of the technical and sociocultural dimensions of global food insecurity.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

AGRO 431 Site-specific Crop Management
Crosslisted with: AGEN 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

AGRO 434 Plant Biochemistry
Crosslisted with: BIOC 434, BIOS 434, CHEM 434, AGRO 834, BIOS 834, CHEM 834
Prerequisites: BIOC/BIOS/CHM 431/831.
Description: Biochemical metabolism unique to plants. Relationships of topics previously acquired in general biochemistry to biochemical processes unique to plants. Biochemical mechanisms behind physiological processes discussed in plant or crop physiology.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

AGRO 435 Agroecology
Crosslisted with: AGRO 835, HORT 435, NRES 435, NRES 835
Prerequisites: For AGRO/HORT/NRES 435: Senior standing or permission. For AGRO/NRES 835: 12 hrs biological or agricultural sciences or permission.
Description: Integration of principles of ecology, plant and animal sciences, crop protection, and rural landscape planning and management for sustainable agriculture. Includes natural and cultivated ecosystems, population and community ecology, nutrient cycling, pest management, hydrologic cycles, cropping and grazing systems, landscape ecology, biodiversity, and socioeconomic evaluation of systems.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
ACE: ACE 10 Integrated Product
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Crosslisted with</th>
<th>Prerequisites</th>
<th>Description</th>
<th>Max credits per semester</th>
<th>Max credits per degree</th>
<th>Format</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGRO 436</td>
<td>Agroecosystems Analysis</td>
<td>AGRO 836, HORT 436, HORT 836</td>
<td>Senior standing.</td>
<td>Analysis of production, economics, environmental impacts, and social integration aspects of farms and farming systems</td>
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<tr>
<td>AGRO 437</td>
<td>Animal, Food and Industrial Uses of Grain</td>
<td>AGRO 837</td>
<td>CHEM 105 or 109, and one of the following: AGRO 204 or ASCI 250.</td>
<td>Identification and comparison of grain quality characteristics desired by livestock feeders, human food processors and industrial users, and methods used to measure these characteristics.</td>
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<td>AGRO 438</td>
<td>Producing Grain for Animal, Food and Industrial Uses</td>
<td>AGRO 838</td>
<td>CHEM 109 and one of the following: AGRO 204 or ASCI 250.</td>
<td>Genetic development, production practices, and grain handling and storage procedures to deliver quality grain to livestock feeders, human food processors and industrial uses.</td>
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<tr>
<td>AGRO 439</td>
<td>Organic Farming and Food Systems</td>
<td>AGRO 839, HORT 439, HORT 839</td>
<td>12 credits of agricultural or biological science, economics, or natural resources</td>
<td>History of organic farming and horticultural systems, organic certification, nutrient and pest management in organic systems, planning organic enterprises including production and marketing, resilience of organic systems in ecological, economic, and social terms; future issues and potentials of organic food systems.</td>
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<td>AGRO 440</td>
<td>Great Plains Ecosystem</td>
<td>AGRO 840, NRES 840, RNGE 440, NRES 440</td>
<td>Junior standing. BIOS 101 and 101L, or equivalent, recommended.</td>
<td>Characteristics of Great Plains ecosystems, interrelationships of ecological factors and processes, and their application in the management of grasslands. Interactions of fire, vegetation, grazing animals and wildlife.</td>
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<td>AGRO 441</td>
<td>Perennial Plant Function, Growth, and Development</td>
<td>AGRO 841, HORT 441, HORT 841, RNGE 441</td>
<td>AGRO 325 or equivalent.</td>
<td>Principles of crop physiology and developmental morphology in relation to function, growth, development, and survival of perennial forage, range, and turf plants. The relationship of physiology and morphological development on plant use and management.</td>
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<td>AGRO 442</td>
<td>Wildland Plants</td>
<td>AGRO 842, NRES 842, RNGE 442, NRES 442</td>
<td>Junior standing. BIOS 101 and 101L, or equivalent, recommended.</td>
<td>Wildland plants that are important to grassland and shrubland ecosystem management and production. Distribution, utilization, classification, identification (including identification by vegetative parts), uses by Native Americans, and recognition of grasses, fords, shrubs, exotic and wetland plants.</td>
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<tr>
<td>AGRO 444</td>
<td>Ecosystem Monitoring and Assessment</td>
<td>AGRO 844, NRES 844, RNGE 444, NRES 444</td>
<td>Junior standing. NRES 220 or equivalent, recommended</td>
<td>Measurement and monitoring of the important vegetation and environmental factors used to develop management guidelines in grasslands, savannas, woodlands, and wetlands. Emphasis on using ecosystem monitoring protocols for assessment of wildlife habitat, fuels management for wild-land fire, livestock production, and watershed function. Requires field sampling and travel to local field sites.</td>
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<tr>
<td>AGRO 445</td>
<td>Livestock Management on Range and Pasture</td>
<td>AGRO 845, ASCI 451, ASCI 851, RNGE 445</td>
<td>ASCI 250 and AGRO 240 or 340; AECN 201 recommended.</td>
<td>Analyzing the plant and animal resources and economic aspects of pasturage. Management of pasture and range for continued high production emphasized.</td>
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ACE: ACE 10 Integrated Product

AGRO 450 Climate and Society
Crosslisted with: GEOG 450, METR 450, NRES 452, AGRO 850, GEOG 850, METR 850, NRES 852
Prerequisites: METR 100 or NRES 370 or equivalent.
Description: Impact of climate and extreme climatic events on society and societal responses to those events. Global in scope and interdisciplinary.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Groups: Physical Geography
AGRO 452 Irrigation Systems Management
Crosslisted with: MSYM 452, MSYM 852, WATS 452
Prerequisites: MSYM 109 or PHYS 141 or PHYS 151 or PHYS 211
Notes: AGRO/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
Format: LEC
Offered: FALL

AGRO 453 Urban Soil Properties and Management
Crosslisted with: HORT 453, LARC 453, SOIL 453
Prerequisites: AGRO/HORT/SOIL 153.
Description: Characteristics of soils in urban settings. Evaluation of soils intended for intensive human uses. Manipulation and remediation of soils subject to construction and other stresses.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

AGRO 455 Soil Chemistry and Mineralogy
Crosslisted with: AGRO 855, NRES 455, NRES 855, SOIL 455
Prerequisites: AGRO/HORT/SOIL 153 or GEOL 101; CHEM 109 and 110; CHEM 221 or 251; or equivalent.
Description: Chemical and mineralogical properties of soil components. Inorganic colloidal fraction. Structures of soil minerals as a means of understanding properties, such as ion exchange and equilibria; release and supply of nutrient and toxic materials; and soil acidity and alkalinity.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

AGRO 458 Soil Physical Determinations
Crosslisted with: AGRO 858, NRES 458, NRES 858, SOIL 458
Prerequisites: SOIL/AGRO/GEOL/WATS 361; PHYS 141 or equivalent; MATH 102 or 103.
Description: Survey of measurement techniques and principles used in characterizing the physical properties of soils. Includes analysis of experimental design and sources of experimental error. Techniques include: particle size analysis, soil water content, pore size analysis, field sampling techniques, soil strength, and saturated hydraulic conductivity.
Credit Hours: 2
Max credits per semester: 2
Max credits per degree: 2
Format: LAB

AGRO 460 Soil Microbiology
Crosslisted with: BIOS 447, NRES 460, SOIL 460, AGRO 860, BIOS 847, NRES 860
Prerequisites: One semester microbiology; one semester biochemistry or organic chemistry.
Description: Soil from a microbe's perspective-growth, activity and survival strategies; principles governing methods to study microorganisms and biochemical processes in soil; mechanisms controlling organic matter cycling and stabilization with reference to C, N, S, and P; microbial interactions with plants and animals; and agronomic and environmental applications of soil microorganisms.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

AGRO 461 Soil Physics
Crosslisted with: GEOL 461, NRES 461, SOIL 461, WATS 461, AGRO 861, GEOL 861, NRES 861
Prerequisites: AGRO/SOIL 153; PHYS 141 or equivalent, one semester of calculus.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

AGRO 469 Bio-Atmospheric Instrumentation
Crosslisted with: GEOG 469, HORT 407, METR 469, MSYM 469, NRES 469, AGRO 869, GEOG 869, HORT 807, METR 869, MSYM 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
Format: LEC

AGRO 470 Critical Thinking in Landscape Management
Crosslisted with: HORT 470, TLMT 470
Prerequisites: AGRO/HORT/PGMP/TLMT 326.
Description: Using processes and strategies to identify and compare issues, make recommendations, demonstrate proficiency in field application as skills and techniques, and prepare cost estimates in the development of landscape management plans.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
ACE: ACE 10 Integrated Product
AGRO 472 Applied Soil Physics
Crosslisted with: AGRO 872, NRES 472, NRES 872, SOIL 472, WATS 472
Prerequisites: AGRO/HORT/SOIL 153 or equivalent; MATH 104 or MATH 106 or equivalent.
Description: Emphasis on applied soil physics. Discussion of theoretical principles followed by field and laboratory exercises and applications. Fluxes of water, solutes, air, and heat through the soil. Emphasis on water infiltration, water retention, other soil hydraulic properties. Components of soil water balance. Management of soil water.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

AGRO 475 Water Quality Strategy
Crosslisted with: NRES 475, NRES 875, SOCI 475, SOCI 875, SOIL 475, WATS 475, AGRO 875, CIVE 475, CIVE 875, CRPL 875, CRPL 875, GEOL 475, GEOL 875, MSYM 475, MSYM 875, POLS 475, POLS 875
Prerequisites: Senior standing or permission
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
Format: LEC
ACE: ACE 10 Integrated Product
Groups: American Government & Public Pol

AGRO 477 Great Plains Field Pedology
Crosslisted with: GEOG 467, NRES 477, SOIL 477, GEOG 867, NRES 877
Prerequisites: AGRO/SOIL 153.
Description: Spatial relationship of soil properties on various parts of landscape typical of the Plains, causal factors, and predictions of such relationships on other landscapes. Grouping these properties into classes, naming the classes, and the taxonomy that results from this grouping. Application of a taxonomy to a real situation through making a field soil survey in a region representative of the Plains border, predicting land use response of various mapped units as it affects the ecosystem, and evaluating the effectiveness of the taxonomic system used in the region surveyed.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Format: LEC
Groups: Physical Geography

AGRO 480 Modified Rootzones
Crosslisted with: HORT 480, TLMT 480, TLMT 880, AGRO 880, HORT 880
Description: Modified rootzones and their applications in the turfgrass and landscape management industry. Correct applications and construction techniques. Offered as a five-week course.
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 1
Format: LEC

AGRO 484 Water Resources Seminar
Crosslisted with: GEOG 484, GEOG 484, NRES 484, WATS 484, NRES 884, AGRO 884, GEOG 884, GEOL 884, WATS 884
Prerequisites: Junior or above standing, or permission
Description: Seminar on current water resources research and issues in Nebraska and the region.
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 1
Format: LEC

AGRO 488 Business Management for Agricultural Enterprises
Crosslisted with: HORT 488, HORT 888, EAEP 488, EAEP 888, ENTR 888, ABUS 488
Description: Research a specific agricultural enterprise. Develop and present a business plan using materials from the primary area of interest. HORT 488/888 requires the completion of a shadowing assignment and the analysis of case studies.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
ACE: ACE 10 Integrated Product

AGRO 489 Urbanization of Rural Landscapes
Crosslisted with: AGRO 889, CRPL 489, HORT 489, HORT 889, CRPL 889
Prerequisites: Senior standing, graduate standing, or permission.
Description: Development converts rural landscapes into housing, roads, malls, parks, and commercial uses. This process fragments landscapes and changes ecosystem functions, drives up land prices, and pushes agriculture into more marginal areas. This multi-disciplinary, experiential course guides students in learning about the urbanization process, the impacts on landscapes, people, and the community, and the choices that are available to informed citizens.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

AGRO 495 Grasslands Seminar
Crosslisted with: ENTO 495, GRAS 495, HORT 495, NRES 495, RGNE 495, SOIL 495
Prerequisites: Junior standing.
Description: Topic varies and deals with different aspects of forage and/or range and/or livestock, turf and/or landscape grasses, natural habitats, and wetlands.
Credit Hours: 1-2
Min credits per semester: 1
Max credits per semester: 2
Max credits per degree: 4
Format: LEC

AGRO 496 Independent Study
Crosslisted with: AGRO 896, RGNE 496, SOIL 496
Credit Hours: 1-6
Min credits per semester: 1
Max credits per semester: 6
Max credits per degree: 12
Format: IND
AGRO 498 Senior Project
Crosslisted with: SOIL 498
Prerequisites: Senior standing.
Notes: A two-semester sequence. Students should select one credit hour the first semester and three credits the second semester. The first semester will be used for planning, topic selection, and identifying a project adviser. The second semester will be used to carry out the research project, prepare a written report, and possibly an oral presentation.
Description: Carry out and report on a research project.
Credit Hours: 1-3
Min credits per semester: 1
Max credits per semester: 3
Max credits per degree: 3
Format: IND

AGRO 499H Honors Thesis
Crosslisted with: RNGE 499H, SOIL 499H
Prerequisites: Admission to the University Honors Program and permission, 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
Format: IND

HORT 127 Survey of Turfgrass and Landscape Management
Crosslisted with: TLMT 127, AGRO 127
Description: Introduction to careers, internships and co-curricular activities in turfgrass and landscape management.
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 1
Format: LEC

HORT 130 Introduction to Horticulture Science
Description: Introduction to the scientific concepts and practical skills involved in horticultural science.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Format: LEC
Prerequisite for: AGRO 227, HORT 227, PGAM 227, TLMT 227; HORT 325

HORT 131 Plant Science
Crosslisted with: AGRO 131
Description: Biology of plants grown for food, fiber, fun, or fuel. Plant life cycles in managed ecosystems and their role in global carbon and water cycles. Mechanisms plants use to drive and control their growth, propagate, and change to compete with other organisms in their environment.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Prerequisite for: AGRO 227, HORT 227, PGAM 227, TLMT 227; AGRO 228, HORT 228, TLMT 228; AGRO 240, RNGE 240; HORT 212, NRES 212, LARC 212; HORT 353; HORT 355
ACE: ACE 4 Science

HORT 133 Horticultural Plant Science Laboratory
Prerequisites: AGRO 131 or parallel
Description: Growth, anatomy, morphology and physiology of fruits, vegetables, woody plants, ornamentals and turf. Emphasis on both field and greenhouse grown horticultural plants.
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 1
Format: LAB
Prerequisite for: HORT 355

HORT 153 Soil Resources
Crosslisted with: AGRO 153, SOIL 153
Prerequisites: High school chemistry or one semester college chemistry.
Description: Characteristics of soils in relation to their appropriate uses and protection. Principles and practices using cooperative exercises including discussion, assessment, planning, problem-solving, writing, and presentation involving all aspects of soils.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Format: LEC
Prerequisite for: AGRO 327, HORT 327, TLMT 327; AGRO 361, GEOL 361, NRES 361, SOIL 361, WATS 361; AGRO 455, AGRO 855, NRES 455, NRES 855, SOIL 455, AGRO 472, AGRO 872, NRES 472, NRES 872, SOIL 472, WATS 472; NRES 245, AGRO 245; NRES 319

HORT 170 Residential Landscape Design
Description: Introductory course in home landscaping focusing on basic design elements and processes. Students prepare a program, analyze a dwelling and site, determine a phased budget, conceptualize a layout, and select detailed elements and techniques to implement a design for an actual residence.
Credit Hours: 2
Max credits per semester: 2
Max credits per degree: 2
Format: LEC

HORT 200 Landscape and Environmental Appreciation
Crosslisted with: GEOG 200, LARC 200
Description: Values and processes in human landscapes and natural environments. Concepts and tools to understand the context of local and global environments and significant historical landscapes. Landscape as an indicator of aesthetic quality, design principles and processes as integrators of humans and nature, and the garden as a model for creating sustainable landscapes.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Prerequisite for: HORT 267
ACE: ACE 9 Global/Diversity ACE 7 Arts
Groups: Human-Economic Geography
HORT 212 Landscape Plants I
Crosslisted with: NRES 212, LARC 212
Prerequisites: HORT 131
Notes: Requires Saturday off-campus field trips.
Description: Identification using botanical and common names for herbaceous annuals, perennials, grasses, ground covers, vines, trees, and shrubs commonly found in Great Plains gardens, parks, and landscapes is stressed through field visits.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

HORT 213 Landscape Plants II
Crosslisted with: NRES 213, LARC 213
Prerequisites: HORT/LARC/NRES 212.
Notes: Continuation of HORT/LARC/NRES 212. Continuation of HORT/LARC/NRES 212.
Description: Site requirements, landscape use, natural history, and specific needs of herbaceous ornamentals, grasses, ground covers, vines, trees, and shrubs commonly found in Great Plains gardens, parks, and landscapes. Common cultivars and additional species not covered in HORT/LARC/NRES 212.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

HORT 214 Herbaceous Landscape Plants
Crosslisted with: NRES 214
Description: Identification of herbaceous plants with ornamental value in the landscape including native and introduced annuals, perennials, grasses and cultivars. Typical ecological associations, environmental tolerances and/or intolerance, cultural requirements, and design characteristics.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

HORT 215 Genetics
Crosslisted with: AGRO 215, TLMT 215
Prerequisites: 3 hrs biological sciences
Description: Discovery of the biology of genes and the application of genetics principles to understand the control and inheritance of traits in families and populations. Focus is on animals and plants that are important in medicine, agriculture and nature. Learning emphasis is problem solving via online, instant feedback assessments, group discussion, experimental data analysis and context-based exams.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Format: LEC
Prerequisite for: ASCI 330

HORT 216 Plant Breeding Principles and Practice
Crosslisted with: AGRO 216, BIOS 216
Prerequisites: High school biology and chemistry. BIOS 101 and 101L, or 102 or equivalent recommended.
Description: Plant breeding theory and technique. Application of genetic principles to plant improvement. Experience with breeding agronomic and horticultural plant species to illustrate plant mating systems and breeding principles.
Credit Hours: 2
Max credits per semester: 2
Max credits per degree: 2
Format: LEC

HORT 221 Plant Propagation
Prerequisites: BIOS 109 or permission.
Description: Principles and practices involved in sexual and asexual propagation of herbaceous and woody plants. Laboratory work includes actual practice to gain skill and experience on the different methods of propagating plants.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Prerequisite for: HORT 325

HORT 227 Introductory Turfgrass Management
Crosslisted with: AGRO 227, PGAM 227, TLMT 227
Prerequisites: AGRO 131 or HORT 130 or BIOS 109.
Description: Introduction to turfgrasses, their management and use, and to the turfgrass industry.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Prerequisite for: AGRO 326, HORT 326, TLMT 326; AGRO 327, HORT 327, TLMT 327

HORT 228 Introduction to Landscape Management
Crosslisted with: AGRO 228, TLMT 228
Prerequisites: AGRO 131 or BIOS 109
Notes: TLMT/AGRO/HORT uses a team approach to problem solving, discussion, assessment planning, and oral presentations of applied case studies.
Description: An overview of landscape management and landscape design. Principles and practices.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Prerequisite for: AGRO 326, HORT 326, TLMT 326

HORT 229 Introductory Turfgrass Management Laboratory
Crosslisted with: TLMT 229, AGRO 229
Description: Laboratory covering turfgrass identification and management. Concurrent enrollment with AGRO/HORT/TLMT 227 preferred. Required for Turfgrass Science majors, other students require instructor consent.
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 1
Format: LAB
HORT 242 North American Wildland Plants
Crosslisted with: AGRO 242, RNGE 242
Prerequisites: Permission, AGRO/RNGE 240 recommended.
Description: Identification and description of two-hundred important wildland plants of North America. Characteristics of these plants evaluated in terms of management implications.
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 4
Format: LEC

HORT 261 Floral Design I
Description: Principles of floral design and retail florist shop management, while offering practical experience in all aspects of flower arranging. Includes identification, care and handling, marketing and critiquing of floral designs.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Prerequisite for: HORT 262
ACE: ACE 7 Arts

HORT 262 Floral Design II
Prerequisites: HORT 261 or permission.
Description: Advanced styles of floral design, foliage plant care and retail shop layout, as well as practical business knowledge in managing a small business. Topics include personnel, advertising, sales and floral marketing.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

HORT 265 Visual Communication for Landscape Design
Prerequisites: HORT 200.
Description: Graphic and oral presentation techniques for landscape design; sketching; introduction to use of various media and computers for visual communication and landscape analysis.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LAB
Prerequisite for: HORT 267

HORT 267 Introduction to Landscape Design Studio
Prerequisites: HORT 200, HORT 265 or permission
Notes: HORT 267 requires individual and team projects, studio critiques, presentations, and may require off-campus site visits outside of scheduled class time.
Description: Introduction to the process and elements of landscape design.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: SDO
Prerequisite for: HORT 300; HORT 301
Groups: Techniques

HORT 270 Biological Invaders
Crosslisted with: AGRO 270, NRES 270, PLPT 270
Prerequisites: 3 hrs biological sciences.
Description: Impact of exotic species and invasive organisms: agricultural and medical emerging disease; predicting biological invasions; biological control; regulatory, monitoring, and control efforts; ecological impact.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

HORT 275 Agribusiness Entrepreneurial Finance
Crosslisted with: AECN 275, EAEP 275, ENTR 275, AGRO 275
Description: Overview of financial issues for agribusiness start-ups. Business funding specific to new enterprises. Case studies on financial practices for start-up firms.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

HORT 300 Introduction to Landscape Construction
Prerequisites: HORT 267 or concurrent
Notes: Offered Spring Semester of odd years and alternate with HORT 301. HORT 300 requires field trips to landscape installation sites.
Description: Materials, systems, and methods for constructing landscapes.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Offered: SPRING

HORT 301 Introduction to Landscape Contracting
Prerequisites: HORT 267 and HORT 388 or concurrent
Notes: Offered Spring of even years and alternate with HORT 300.
Description: Overview of the landscape contracting business and administration of contracts, cost estimation and bidding.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Offered: SPRING
Groups: Techniques

HORT 325 Greenhouse Practices and Management
Prerequisites: HORT 130, 221
Description: Principles underlying the management of the greenhouse.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Format: LEC
HORT 326 Landscape Solutions
Crosslisted with: AGRO 326, TLMT 326
Prerequisites: TLMT/AGRO/HORT 227 or 228
Description: Using processes and problem-solving approach to identify and analyze common landscape management situations in commercial, public, and residential landscapes. Integrate design, environment, function, pest and disease, and existing management practices to produce recommendations.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

HORT 327 Turfgrass Science and Management
Crosslisted with: AGRO 327, TLMT 327
Prerequisites: AGRO/HORT/SOIL 153; CHEM 105 or 109; and TLMT 227
Description: Scientific principles of turf species adaptation, turf and/or soil relationships, establishment, fertility, mowing, irrigation, and pest control of turf species.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

HORT 330 Pruning Ornamentals
Crosslisted with: AGRO 330, TLMT 330
Description: Why, when and how to prune ornamental landscape plants. Demonstrations and field opportunities on how to choose and how to use pruning tools correctly.
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 1
Format: LEC

HORT 352 Production and Physiology of Horticultural Crops
Prerequisites: HORT 130 or AGRO 131; parallel HORT 353 or 354.
Description: Principles underlying the management and production of floricultural, fruit and vegetable crops.
Credit Hours: 2
Max credits per semester: 2
Max credits per degree: 2
Format: LEC

HORT 353 Vegetable Crop Production Laboratory
Prerequisites: AGRO/HORT 131. HORT 133 suggested.
Description: Vegetable crop production principles and practices, both locally and from a global perspective. Experience with seeding, transplant production, and growing of vegetables in field and greenhouse.
Credit Hours: 2
Max credits per semester: 2
Max credits per degree: 2
Format: LAB

HORT 354 Fruit Production Laboratory
Prerequisites: HORT 130 or AGRO 131.
Description: Fruit crop production principles and practices, both locally and from a global perspective. Experience with planting, pruning and layout of orchard, vineyard and small fruit crops, greenhouse propagation, and production practices.
Credit Hours: 2
Max credits per semester: 2
Max credits per degree: 2
Format: LAB

HORT 355 Perennial, Pot and Bedding Plant Production Laboratory
Prerequisites: AGRO/HORT 131 and HORT 133; HORT 352 recommended.
Description: Growing conditions of specific perennial, annual, pot plants, cut flowers. How to schedule and cost account plant production. Care of post-production plants. Experience propagating and growing perennial, pot and bedding plants and cut flowers in the greenhouse.
Credit Hours: 2
Max credits per semester: 2
Max credits per degree: 2
Format: LAB

HORT 370 Biology of Fungi
Crosslisted with: AGRO 370, PLPT 370
Prerequisites: 8 hrs biological sciences.
Description: Survey of fungi in natural and human ecosystems: symbiotic relationships; as disease agents in humans, animals, and plants; applications in food, agricultural, and pharmaceutical industries; historical and current impacts on society.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

HORT 388 Agribusiness Entrepreneurship
Crosslisted with: AGRO 388, ENTR 388, EAP 388, ABUS 388
Description: Overview of types of agricultural enterprises. Basic accounting principles as they relate to agricultural businesses. Requires completion of a marketing plan specific to agricultural enterprises based on a business idea. Student team projects with emphasis on marketing.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Prerequisite for: HORT 301

HORT 395 Career Experience
Crosslisted with: TLMT 395
Prerequisites: Sophomore standing; HORT or AGRO or TLMT major.
Notes: HORT/TLMT 395 requires advanced permission before registering for the course. A written and oral report is required at the completion of the career experience.
Description: Participation in a horticulture enterprise (other than in one of those in which the student has had previous experience).
Credit Hours: 1-5
Min credits per semester: 1
Max credits per semester: 5
Max credits per degree: 5
Format: FLD

HORT 396 Current Projects and Topics in Horticulture
Prerequisites: Sophomore standing; 12 hours in subject areas dealing with plant sciences; and permission.
Notes: A completed and approved study plan contract is required.
Description: Independent or group projects, readings, or research focusing on current aspects of horticulture.
Credit Hours: 1-5
Min credits per semester: 1
Max credits per semester: 5
Max credits per degree: 5
Format: IND
HORT 399 Independent Study
Prerequisites: Junior standing; 12 hrs plant science; and permission.
Notes: HORT 399 requires advance approval of plan of work and is to be under the supervision and evaluation of a Horticulture departmental faculty member. Oral and written reports are mandatory at the completion of this Independent Study.
Description: Individual or group projects in research, literature review, or extension of course work.
Credit Hours: 1-5
Min credits per semester: 1
Max credits per semester: 5
Max credits per degree: 12
Format: IND

HORT 403 Scientific Writing and Communication
Crosslisted with: AGRO 403, AGRO 803, HORT 803
Prerequisites: Senior standing or higher, an ACE 1 written communication course, an ACE 2 oral communication course, and permission of instructor
Description: Reading and critiquing, writing, and presenting scientific information. Use research data to compose a manuscript in standard scientific format, and prepare and present a poster to a general audience. Ethical issues in research and writing.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
ACE: ACE 10 Integrated Product

HORT 406 Plant Ecophysiology: Theory and Practice
Crosslisted with: AGRO 806, HORT 806, NRES 806, AGRO 406
Prerequisites: Junior standing; 4 hrs ecology; and 4 hrs botany or plant physiology.
Description: Principles of plant physiology which underlie the relationship between plants and their physical, chemical and biotic environments. An introduction to the ecological niche, limiting factors and adaptation. An overview of the seed germination and ecology, plant and soil water relations, nutrients, plant energy budgets, photosynthesis, carbon balance and plant-animal interactions. An introduction to various field equipment used in ecophysiological studies.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Format: LEC

HORT 407 Bio-Atmospheric Instrumentation
Crosslisted with: AGRO 469, GEOG 469, METR 469, MSYM 469, NRES 469, AGRO 869, GEOG 869, HORT 807, METR 869, MSYM 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
Format: LEC
Groups: Physical Geography

HORT 408 Microclimate: The Biological Environment
Crosslisted with: AGRO 408, GEOG 408, METR 408, NRES 408, WATS 408, AGRO 808, GEOG 808, HORT 808, METR 808, NRES 808
Prerequisites: Junior standing, MATH 106 or equivalent, 5 hrs physics, major in any of the physical or biological sciences or engineering; or permission.
Description: Physical factors that create the biological environment. Radiation and energy balances of earth’s surfaces, terrestrial and marine. Temperature, humidity, and wind regimes near the surface. Control of the physical environment through irrigation, windbreaks, frost protection, manipulation of light, and radiation. Applications to air pollution research. Instruments for measuring environmental conditions and remote sensing of the environment.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Groups: Physical Geography

HORT 409A Case studies in plant breeding: Breeding for Disease Resistance
Crosslisted with: AGRO 409A, AGRO 809A, HORT 809A
Description: The application of fundamental genetics principles in inheritance, gene mapping and DNA analysis to decision making by plant breeders with the goal of improving disease resistance in crop cultivars. Learning is structured by the genetics discovery story told in published research articles and the thinking process of plant breeders who will use these discoveries in their work.
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 1
Format: LEC

HORT 409B Case Studies in plant breeding: Transgenic strategies for disease resistance
Crosslisted with: AGRO 409B, AGRO 809B, HORT 809B
Description: The application of basic science and technology by plant genetic engineering experts with the goal of teaming with plant breeders to improve disease resistance in crop cultivars. Learning is structured by the genetics discovery story told in published research articles and the thinking process of genetic engineers and plant breeders who will use these discoveries in their work.
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 1
Format: LEC

HORT 414 Turfgrass Disease Management
Crosslisted with: AGRO 414, AGRO 814, HORT 814, PLPT 414, PLPT 814, TLMT 414, TLMT 814
Prerequisites: BIOS/PLPT 369 or one semester of introductory plant pathology.
Description: Pathogens, epidemiology, and control of diseases specific to turfgrass.
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 1
Format: LEC
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Crosslisted with</th>
<th>Prerequisites</th>
<th>Description</th>
<th>Credit Hours</th>
<th>Max credits per semester</th>
<th>Max credits per degree</th>
<th>Format</th>
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</thead>
<tbody>
<tr>
<td>HORT 418</td>
<td>Agroforestry Systems in Sustainable Agriculture</td>
<td>AGRO 426, AGRO 826, HORT 826, NRES 426, NRES 826</td>
<td>AGRO/HORT/SOIL 153; BIOS 109.</td>
<td>The roles of woody plants in sustainable agricultural systems of temperate regions. Emphasis on the ecological and economic benefits of trees and shrubs in the agricultural landscape. Topics include: habitat diversity and biological control; shelterbelts structure, function, benefits and design; intercropping systems; silvopastoral systems; riparian systems; and production of timber and specialty crops. Comparison of temperate agroforestry systems to those of tropical areas.</td>
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<tr>
<td>HORT 425</td>
<td>Invasive Plants</td>
<td>AGRO 426, AGRO 826, HORT 826, NRES 426, NRES 826</td>
<td>AGRO/HORT/SOIL 153; BIOS 109.</td>
<td>Principles of invasive plant management by preventative, cultural, biological, mechanical and chemical means using an adaptive management framework. Herbicide terminology and classification, plant-herbicide and soil-herbicide interactions, equipment calibration and dosage calculations.</td>
<td>3</td>
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<tr>
<td>HORT 426</td>
<td>Turfgrass Systems Management</td>
<td>AGRO 427, TLMT 427, AGRO 827, HORT 827, TLMT 827</td>
<td>TLMT 227 and TLMT 327.</td>
<td>Critical evaluation of turfgrass settings to create economical and environmentally friendly management systems for professionally managed turf areas.</td>
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<tr>
<td>HORT 435</td>
<td>Agroecology</td>
<td>AGRO 435, AGRO 835, NRES 435, NRES 835</td>
<td>AGRO/HORT/NRES 435.</td>
<td>Integration of principles of ecology, plant and animal sciences, crop protection, and rural landscape planning and management for sustainable agriculture. Includes natural and cultivated ecosystems, population and community ecology, nutrient cycling, pest management, hydrologic cycles, cropping and grazing systems, landscape ecology, biodiversity, and socioeconomic evaluation of systems.</td>
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<tr>
<td>HORT 436</td>
<td>Agroecosystems Analysis</td>
<td>AGRO 436, AGRO 836, HORT 836</td>
<td>AGRO/HORT/SOIL 153; BIOS 109.</td>
<td>Analysis of production, economics, environmental impacts, and social integration aspects of farms and farming systems</td>
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<tr>
<td>HORT 439</td>
<td>Organic Farming and Food Systems</td>
<td>AGRO 839, AGRO 439, HORT 839</td>
<td>AGRO/HORT/SOIL 153; BIOS 109.</td>
<td>Planning of organic farms and farming systems, including production and marketing, resilience of organic systems in ecological, economic, and social terms; future issues and potentials of organic food systems.</td>
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<tr>
<td>HORT 441</td>
<td>Perennial Plant Function, Growth, and Development</td>
<td>AGRO 441, AGRO 841, HORT 841, RNGE 441</td>
<td>AGRO/HORT/SOIL 153; BIOS 109.</td>
<td>Principles of crop physiology and developmental morphology in relation to function, growth, development, and survival of perennial forage, range, and turf plants. The relationship of physiology and morphological development on plant use and management.</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>LEC</td>
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</tbody>
</table>
HORT 462 Nursery Management and Crop Production
Prerequisites: AGRO/HORT 131; HORT 221
Notes: Offered spring semester of even-numbered calendar years.
HORT 462 requires a culminating group project creating one of four types of nursery landscape businesses.
Description: Principles underlying the production of nursery crops and the profitable management of a nursery. Propagation, crop scheduling, transplanting, handling, and transportation of nursery crops. Cultural considerations such as media, fertilizers, irrigation, and pest control. Economic aspects of running a business include creating income and balance sheets.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Format: LEC
ACE: ACE 10 Integrated Product

HORT 467 Planting Design
Crosslisted with: ARCH 467, ARCH 567, ARCH 867, LARC 467
Prerequisites: HORT/LARC/NRES 212; ARCH 210 or HORT/LARC 266.
Description: Design processes, principles, and elements as applied to the use of native and ornamental plant materials. Aesthetic, functional, and micro-climatic arrangements of plant material in parks, on commercial property, on home grounds, along roadways, and in urban open spaces. Develop a palette of plants and graphics for designs.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Format: LEC

HORT 469 Senior Landscape Design
Crosslisted with: ARCH 469
Prerequisites: HORT 341 and/or permission.
Description: Capstone course for the landscape option. Students work individually on real-world projects with actual clients. They select the project location and scope in consultation with the instructor prior to the semester this course is taken. The project must reflect evidence of a design process, design articulation and communication understandable to the client and provide in depth drawings, details needed to carry out the implementation of the design.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Format: SDO
ACE: ACE 10 Integrated Product

HORT 470 Critical Thinking in Landscape Management
Crosslisted with: AGRO 470, TLMT 470
Prerequisites: AGRO/HORT/PGMP/TLMT 326.
Description: Using processes and strategies to identify and compare issues, make recommendations, demonstrate proficiency in field application as skills and techniques, and prepare cost estimates in the development of landscape management plans.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
ACE: ACE 10 Integrated Product

HORT 471 Vines, Wines and You
Crosslisted with: HORT 471, NUTR 471, NUTR 871, HRTM 471, HRTM 871
Prerequisites: 6 hrs science or equivalent experience; 21 years of age or older
Notes: Proof of age is required.
Description: Origin, botany, historical and cultural significance of the grapevine and related species. Principles and practices of vineyard establishment, management and processing of grape products, importance and/or scope of grape and wine industry; global and local significance. Culinary applications, health, environmental and safety-related issues, business and industry relations and experience.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

HORT 480 Modified Rootzones
Crosslisted with: AGRO 480, TLMT 480, TLMT 880, AGRO 880, HORT 880
Description: Modified rootzones and their applications in the turfgrass and landscape management industry. Correct applications and construction techniques. Offered as a five-week course.
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 1
Format: LEC

HORT 488 Business Management for Agricultural Enterprises
Crosslisted with: HORT 888, EAEP 488, AGRO 488, ENTR 488, EAEP 888, AGRO 888, ENTR 888, ABUS 488
Description: Research a specific agricultural enterprise. Develop and present a business plan using materials from the primary area of interest. HORT 488/888 requires the completion of a shadowing assignment and the analysis of case studies.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
ACE: ACE 10 Integrated Product

HORT 489 Urbanization of Rural Landscapes
Crosslisted with: AGRO 489, AGRO 889, CRPL 489, HORT 889, CRPL 889
Prerequisites: Senior standing, graduate standing, or permission.
Description: Development converts rural landscapes into housing, roads, malls, parks, and commercial uses. This process fragments landscapes and changes ecosystem functions, drives up land prices, and pushes agriculture into more marginal areas. This multi-disciplinary, experiential course guides students in learning about the urbanization process, the impacts on landscapes, people, and the community, and the choices that are available to informed citizens.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
HORT 495 Grasslands Seminar
Crosslisted with: AGRO 495, ENTO 495, GRAS 495, NRES 495, RNGE 495, SOIL 495
Prerequisites: Junior standing.
Description: Topic varies and deals with different aspects of forage and/or range and/or livestock, turf and/or landscape grasses, natural habitats, and wetlands.
Credit Hours: 1-2
Min credits per semester: 1
Max credits per semester: 2
Max credits per degree: 4
Format: LEC

HORT 499H Honors Thesis
Prerequisites: Admission to the University Honors Program and permission, AGRI 299H recommended.
Description: Conduct a scholarly research project and write a University Honors Program undergraduate thesis.
Credit Hours: 3-6
Min credits per semester: 3
Max credits per semester: 6
Max credits per degree: 6
Format: IND

PLPT 110 Molds and Man
Prerequisites: Non-science major.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
ACE: ACE 4 Science

PLPT 270 Biological Invaders
Crosslisted with: AGRO 270, HORT 270, NRES 270
Prerequisites: 3 hrs biological sciences.
Description: Impact of exotic species and invasive organisms: agricultural and medical emerging disease; predicting biological invasions; biological control; regulatory, monitoring, and control efforts; ecological impact.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

PLPT 369 Introductory Plant Pathology
Crosslisted with: BIOS 369
Prerequisites: BIOS 101 and 101L, or 109.
Description: Introduction to the study of plant diseases including relation of plant disease to crop production, environment, and man. Examples and demonstrations emphasize horticultural and agronomic crops of Nebraska.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

PLPT 369L Introductory Plant Pathology Lab
Prerequisites: Must enroll in both PLPT 369 (lecture) and PLPT 369L (lab)
Description: Optional lab for PLPT 369.
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 1
Format: LAB

PLPT 370 Biology of Fungi
Crosslisted with: AGRO 370, HORT 370
Prerequisites: 8 hrs biological sciences.
Description: Survey of fungi in natural and human ecosystems: symbiotic relationships; as disease agents in humans, animals, and plants; applications in food, agricultural, and pharmaceutical industries; historical and current impacts on society.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

PLPT 414 Turfgrass Disease Management
Crosslisted with: AGRO 414, AGRO 814, HORT 414, HORT 814, PLPT 814, TLMT 414, TLMT 814
Prerequisites: BIOS/PLPT 369 or one semester of introductory plant pathology.
Description: Pathogens, epidemiology, and control of diseases specific to turfgrass.
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 1
Format: LEC

PLPT 495 Internship in Plant Pathology
Prerequisites: Junior standing.
Description: Experience in a work place setting that is directly related to Plant Pathology.
Credit Hours: 1-3
Min credits per semester: 1
Max credits per semester: 3
Max credits per degree: 5
Format: IND

PLPT 496 Independent Study
Prerequisites: Advanced approval of the plan of study and permission.
Description: Research, literature review, extension of course work, or preparation of teaching materials.
Credit Hours: 1-5
Min credits per semester: 1
Max credits per semester: 5
Max credits per degree: 5
Format: IND

PLPT 498 Independent Research
Prerequisites: Permission.
Description: Independent research in areas of plant pathology.
Credit Hours: 1-3
Min credits per semester: 1
Max credits per semester: 3
Max credits per degree: 6
Format: IND
PLPT 499H Honors Thesis  
**Prerequisites:** Admission to the University Honors Program and permission, 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  
**Format:** IND

TLMT 127 Survey of Turfgrass and Landscape Management  
**Crosslisted with:** AGRO 127, HORT 127  
**Description:** Introduction to careers, internships and co-curricular activities in turfgrass and landscape management.  
**Credit Hours:** 1  
**Max credits per semester:** 1  
**Max credits per degree:** 1  
**Format:** LEC

TLMT 215 Genetics  
**Crosslisted with:** AGRO 215, HORT 215  
**Prerequisites:** 3 hrs biological sciences  
**Description:** Discovery of the biology of genes and the application of genetics principles to understand the control and inheritance of traits in families and populations. Focus is on animals and plants that are important in medicine, agriculture and nature. Learning emphasis is problem solving via online, instant feedback assessments, group discussion, experimental data analysis and context-based exams.  
**Credit Hours:** 4  
**Max credits per semester:** 4  
**Max credits per degree:** 4  
**Format:** LEC  
**Prerequisite for:** ASCI 330

TLMT 227 Introductory Turfgrass Management  
**Crosslisted with:** AGRO 227, HORT 227, PGAM 227  
**Prerequisites:** AGRO 131 or HORT 130 or BIOS 109.  
**Description:** Introduction to turfgrasses, their management and use, and to the turfgrass industry.  
**Credit Hours:** 3  
**Max credits per semester:** 3  
**Max credits per degree:** 3  
**Format:** LEC  
**Prerequisite for:** AGRO 326, HORT 326, TLMT 326; AGRO 327, HORT 327, TLMT 327

TLMT 228 Introduction to Landscape Management  
**Crosslisted with:** AGRO 228, HORT 228  
**Prerequisites:** AGRO 131 or BIOS 109  
**Notes:** TLMT/AGRO/HORT uses a team approach to problem solving, discussion, assessment planning, and oral presentations of applied case studies.  
**Description:** An overview of landscape management and landscape design. Principles and practices.  
**Credit Hours:** 3  
**Max credits per semester:** 3  
**Max credits per degree:** 3  
**Format:** LEC  
**Prerequisite for:** AGRO 326, HORT 326, TLMT 326

TLMT 229 Introductory Turfgrass Management Laboratory  
**Crosslisted with:** AGRO 229, HORT 229  
**Description:** Laboratory covering turfgrass identification and management. Concurrent enrollment with AGRO/HORT/TLMT 227 preferred. Required for Turfgrass Science majors, other students require instructor consent.  
**Credit Hours:** 1  
**Max credits per semester:** 1  
**Max credits per degree:** 1  
**Format:** LAB

TLMT 295 Turfgrass and Landscape Management Extended Internship  
**Prerequisites:** Sophomore standing; TLMT/AGRO/HORT/PGAM 227 or 228.  
**Notes:** TLMT 295/95 requires advanced permission before registering for the course. A written and oral report is required at the completion of the career experience. Pass/No Pass only.  
**Description:** Participation in a turfgrass or landscape management enterprise (other than in one of those in which the student has had previous experience).  
**Credit Hours:** 1-12  
**Min credits per semester:** 1  
**Max credits per semester:** 12  
**Max credits per degree:** 12  
**Format:** FLD

TLMT 326 Landscape Solutions  
**Crosslisted with:** AGRO 326, HORT 326  
**Prerequisites:** TLMT/AGRO/HORT 227 or 228  
**Description:** Using processes and problem-solving approach to identify and analyze common landscape management situations in commercial, public, and residential landscapes. Integrate design, environment, function, pest and disease, and existing management practices to produce recommendations.  
**Credit Hours:** 3  
**Max credits per semester:** 3  
**Max credits per degree:** 3  
**Format:** LEC

TLMT 327 Turfgrass Science and Management  
**Crosslisted with:** AGRO 327, HORT 327  
**Prerequisites:** AGRO/HORT/SOIL 153; CHEM 105 or 109; and TLMT 227  
**Description:** Scientific principles of turf species adaptation, turf and/or soil relationships, establishment, fertility, mowing, irrigation, and pest control of turf species.  
**Credit Hours:** 3  
**Max credits per semester:** 3  
**Max credits per degree:** 3  
**Format:** LEC

TLMT 330 Pruning Ornamentals  
**Crosslisted with:** AGRO 330, HORT 330  
**Description:** Why, when and how to prune ornamental landscape plants. Demonstrations and field opportunities on how to choose and how to use pruning tools correctly.  
**Credit Hours:** 1  
**Max credits per semester:** 1  
**Max credits per degree:** 1  
**Format:** LEC
TLMT 395 Career Experience  
**Crosslisted with:** HORT 395  
**Prerequisites:** Sophomore standing; HORT or AGRO or TLMT major.  
**Notes:** HORT/TLMT 395 requires advanced permission before registering for the course. A written and oral report is required at the completion of the career experience.  
**Description:** Participation in a horticulture enterprise (other than in one of those in which the student has had previous experience).

**Credit Hours:** 1-5  
**Min credits per semester:** 1  
**Max credits per semester:** 5  
**Max credits per degree:** 5  
**Format:** FLD

TLMT 414 Turfgrass Disease Management  
**Crosslisted with:** AGRO 414, AGRO 814, HORT 414, HORT 814, PLPT 414, PLPT 814, TLMT 814  
**Prerequisites:** BIOS/PLPT 369 or one semester of introductory plant pathology.  
**Description:** Pathogens, epidemiology, and control of diseases specific to turfgrass.  
**Credit Hours:** 1  
**Max credits per semester:** 1  
**Max credits per degree:** 1  
**Format:** LEC

TLMT 427 Turfgrass Systems Management  
**Crosslisted with:** AGRO 427, HORT 427, AGRO 827, HORT 827, TLMT 827  
**Prerequisites:** TLMT 227 and TLMT 327  
**Description:** Critical evaluation of turfgrass settings to create economical and environmentally friendly management systems for professionally managed turf areas.  
**Credit Hours:** 3  
**Max credits per semester:** 3  
**Max credits per degree:** 3  
**Format:** LEC  
**ACE:** ACE 10 Integrated Product

TLMT 470 Critical Thinking in Landscape Management  
**Crosslisted with:** AGRO 470, HORT 470  
**Prerequisites:** AGRO/HORT/PGMP/TLMT 326.  
**Description:** Using processes and strategies to identify and compare issues, make recommendations, demonstrate proficiency in field application as skills and techniques, and prepare cost estimates in the development of landscape management plans.  
**Credit Hours:** 3  
**Max credits per semester:** 3  
**Max credits per degree:** 3  
**Format:** LEC  
**ACE:** ACE 10 Integrated Product

TLMT 480 Modified Rootzones  
**Crosslisted with:** AGRO 480, HORT 480, TLMT 880, AGRO 880, HORT 880  
**Description:** Modified rootzones and their applications in the turfgrass and landscape management industry. Correct applications and construction techniques. Offered as a five-week course.  
**Credit Hours:** 1  
**Max credits per semester:** 1  
**Max credits per degree:** 1  
**Format:** LEC

**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.

# Plant Biology - Biotechnology

**Icon Legend:** Critical

## 16 HR TERM 1

### ACE 3 Math/Statistics

**complete MATH 106**  
**5hr**

### Biological Sciences

**complete LIFE 120, LIFE 120L**  
**4hr**

### ACE 1 Written Comm

**complete 1 from ENGL 150, ENGL 151, ENGL 254, JGEN 120, JGEN 200, JGEN 300**  
**3hr**

### ACE 4 Chemistry

**complete CHEM 109**  
**4hr**

## 16 HR TERM 2

### Gen Botany or Plant Sci

**complete BIOS 109**  
**4hr**

### Life Science

**complete LIFE 121, LIFE 121L**  
**4hr**

**C**

**LIFE 121 & 121L are ideally completed in the second term of enrollment. They become critical to your success in the major if not completed by the third term of enrollment.**

### Soil Resouces

**complete AGRO 153**  
**4hr**

### ACE 4 Chemistry
complete CHEM 110

14 HR TERM 3
Organic Chem/Lab
complete CHEM 251, CHEM 253

ACE 2 Oral Comm
complete 1 from COMM 109, COMM 209, COMM 286

College Course
complete SCIL 101

Ecology
complete BIOS 207

14 HR TERM 4
ACE 4 Physics
complete PHYS 141

Biotechnology Option Elect

Biological Chemistry
4hr complete BIOC 321, BIOC 321L

Biological Sciences
complete AGRO 215

Plant Bio Portfolio/Assess
complete 1 from AGRO92#, HORT92#, NRES92#

15 HR TERM 6
Independent Study/Project
complete 1 from AGRO 496, BIOS 498, HORT 396, HORT 399, NRES 496, RNGE 496, PLPT 496, SOIL 496

Biological Sciences
complete BIOS 471

Biological Sciences
complete AGRO 325

Biotechnology Option Core
complete 1 from BIOS 312, BIOS 478, BIOS 237, BIOC 442, BIOS 427

12 HR TERM 5
<table>
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<th>Term 1</th>
<th>Term 2</th>
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<td><strong>15 HR TERM 7</strong></td>
<td><strong>16 HR TERM 1</strong></td>
</tr>
<tr>
<td><strong>ACE 5 Humanities</strong></td>
<td><strong>ACE 3 Math/Statistics</strong></td>
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<tr>
<td>complete 1 from ACE5</td>
<td>complete MATH 106</td>
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<td><strong>15 HR TERM 7</strong></td>
<td><strong>16 HR TERM 2</strong></td>
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<tr>
<td><strong>ACE 6 Economics</strong></td>
<td><strong>Gen Botany or Plant Sci</strong></td>
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<tr>
<td>complete either ECON 211 or ECON 212</td>
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<tr>
<td><strong>Applied Plant Biology</strong></td>
<td><strong>Biological Sciences</strong></td>
</tr>
<tr>
<td>complete 1 from AGRO 408, AGRO 411, AGRO 412, HORT 221, NRES 406, PLPT369#, HORT 133</td>
<td>complete LIFE 120, LIFE 120L</td>
</tr>
<tr>
<td></td>
<td><strong>4hr</strong></td>
</tr>
<tr>
<td><strong>Plant/Food System Mngt</strong></td>
<td><strong>ACE 1 Written Comm</strong></td>
</tr>
<tr>
<td>complete 1 from AGRO 204, AGRO240, AGRO 227, AGRO 405, AGRO 435, AGRO 426, AGRO 437, AGRO 438, ENTO 115, ENTO 116, FDST 205, HORT 325, HORT 352, HORT 355, HORT 462</td>
<td>complete 1 from ENGL 150, ENGL 151, ENGL 254, JGEN 120, JGEN 200, JGEN 300</td>
</tr>
<tr>
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</tr>
<tr>
<td><strong>ACE 7 Arts</strong></td>
<td><strong>ACE 4 Chemistry</strong></td>
</tr>
<tr>
<td>complete 1 from ACE7</td>
<td>complete CHEM 109</td>
</tr>
<tr>
<td></td>
<td><strong>4hr</strong></td>
</tr>
<tr>
<td><strong>14 HR TERM 8</strong></td>
<td><strong>Electives</strong></td>
</tr>
<tr>
<td><strong>Biotechnology Option Core</strong></td>
<td>complete Any Course</td>
</tr>
<tr>
<td>complete 2 from BIOS 312, BIOS 478, BIOS 237, BIOC 442, BIOS 427</td>
<td><strong>3hr</strong></td>
</tr>
<tr>
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<td><strong>3hr</strong></td>
</tr>
<tr>
<td><strong>Career Experience</strong></td>
<td><strong>Graduation Requirements</strong></td>
</tr>
<tr>
<td>complete 1 from AGRO 295, BIOS 395, HORT 395, NRES 497, RNGE 295, SOIL 295, TLMT 395</td>
<td>1. Performance Measure: 2.00 GPA required for graduation. 2. <em><strong>Total Credits Applying Toward 120 Total Hours</strong></em></td>
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<td><strong>1hr</strong></td>
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<tr>
<td><strong>ACE 8 Ethical Principles</strong></td>
<td><strong>Plant Biology - Ecology &amp; Management</strong></td>
</tr>
<tr>
<td>complete 1 from ACE8</td>
<td>Icon Legend: Critical</td>
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<td><strong>3hr</strong></td>
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**Soil Resouces**
<table>
<thead>
<tr>
<th>Course Type</th>
<th>Course Code</th>
<th>Credits</th>
<th>Notes</th>
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<tbody>
<tr>
<td>14 HR TERM 3</td>
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<tr>
<td>Organic Chem/Lab</td>
<td></td>
<td>4</td>
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<tr>
<td></td>
<td>complete CHEM 251, CHEM 253</td>
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<tr>
<td>ACE 2 Oral Comm</td>
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</tr>
<tr>
<td>College Course</td>
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<tr>
<td></td>
<td>complete SCIL 101</td>
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<tr>
<td>ACE 4 Chemistry</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>complete CHEM 110</td>
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<td></td>
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</tbody>
</table>

| 14 HR TERM 4                    |             |         |       |
| ACE 4 Physics                   |             |         |       |
|                                | complete 1 from PHYS 141, PHYS 151, PHYS 153, PHYS 211, PHYS 221, PHYS 212, PHYS 222 |       |       |
| ACE 3 Math/Statistics           |             |         |       |
|                                | complete STAT 218 |         |       |
| Electives                       |             | 3       |       |
|                                | complete Any Course |         |       |

Complete an Elective, Minor, Secondary Major, or ACE course this term.

| 16 HR TERM 5                    |             |         |       |
| Biological Chemistry            |             |         |       |
|                                | complete BIOC 321, BIOC 321L | 4       |       |
| Biology/Mgt Option Core         |             |         |       |
|                                | complete 1 from AGRO 245, AGRO 444, NRES 310 | 4       |       |
| Biological Sciences             |             |         |       |
|                                | complete AGRO 215 | 4       |       |
| Plant Bio Portfolio/Assess      |             |         |       |
|                                | complete 1 from AGRO92#, HORT92#, NRES92# | 0       |       |
| Biology/Mgt Management          |             |         |       |
|                                | complete 1 from AGRO 204, AGRO 240, AGRO 440, BIOS 454, BIOS 457, BIOS 470, NRES 310, NRES 417, NRES 424, NRES 459, NRES 468 | 4       |       |

| 15 HR TERM 6                    |             |         |       |
| Independent Study/Project       |             |         |       |
|                                | complete 1 from AGRO 496, BIOS 498, HORT 396, HORT 399, NRES 496, RNGE 496, PLPT 496, SOIL 496 | 1       |       |
| Biotechnology Option Elec       |             |         |       |
|                                | complete BIOS 471 | 4       |       |
| Biological Sciences             |             |         |       |
|                                | complete AGRO 325 | 4       |       |

Complete an Elective, Minor, Secondary Major, or ACE course this term.

| College Course                  |             | 3       |       |
|                                | complete SCIL 101 |         |       |

Complete an Elective, Minor, Secondary Major, or ACE course this term.

C

BIOC 321 or 321L becomes critical to your success in the major if not completed by the fifth term of enrollment.
complete 1 from METR 100, NRES 208, NRES 408, WATS 281

**Electives**

**3hr**

**Geospatial Inform Science**

complete 1 from GEOG 412, GEOG 418, NRES 312

**3hr**

**Plant Identification**

complete AGRO 442

**3hr**

**Electives**

**6hr**

Complete an Elective, Minor, Secondary Major, or ACE course this term and also an additional ACE or Elective course.

### 15 HR TERM 7

**ACE 6 Economics**

complete either ECON 211 or ECON 212

**3hr**

**Graduation Requirements**

1. Performance Measure: 2.00 GPA required for graduation.
2. Total Credits Applying Toward 120 Total Hours

### 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**

- North American Trait Integration Breeder, Monsanto - Chesterfield MO
- Plant Protection Technician, USDA - Lincoln NE
- Data Analyst, Zoex Corporation - Houston TX
- Associate Sales Manager, Theisen Seed LLC - Atkinson NE
- Distance Education Instructor, University of Nebraska - Lincoln NE
- Site Manager, Sustainable Agriculture Education - Berkeley CA

**Internships**

- Research Intern, UNL Molecular Plant Physiology - Lincoln NE
- Plant Pathology Intern, Pioneer Hi-Bred - Johnston IA
- Crop Production Intern, UNL Agronomy and Horticulture - Lincoln NE
- Research Intern, UNL Maize Genetics & Breeding - Lincoln NE
- Sales and Marketing Intern, Helena Chemical - Fremont NE
- Computational Biology Intern, UNL Dept of Statistics - Lincoln NE
- Pioneer Sales Associate Intern, Theisen Seed LLC - Atkinson NE
- Intern, Grassland Ecology - Wood River NE
- Research Intern, Nebraska Forest Service - Lincoln NE
- Cover Crop Research Intern, UNL Agronomy and Horticulture - Lincoln NE

**Grad Schools**

- PhD in Genetics, Iowa State University - Ames IA
- PhD in Evolutionary Ecology, Colorado State University - Fort Collins CO
- PhD in Plant Breeding and Genetics, Purdue University - Lafayette IN
- PhD in Entomology, University of Arkansas - Fayetteville AR
- PhD in Agronomy and Horticulture, University of Nebraska-Lincoln - Lincoln NE
- MS in Agronomy, University of Nebraska-Lincoln - Lincoln NE
- MS in Plant Breeding and Genetics, University of Nebraska-Lincoln - Lincoln NE
- MA in Biological Sciences, University of Nebraska-Lincoln - Lincoln NE
- MS in Entomology and Plant Pathology, Colorado State University - Fort Collins CO
- MS in Horticulture, University of Nebraska-Lincoln - Lincoln NE