PLANT BIOLOGY (ASC)

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

The plant biology major is designed to provide a flexible entry for undergraduate students who 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 major or would also 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 and research opportunities.

The goal of the plant biology program is to offer a field of study to students who are interested and talented in the basic sciences and mathematics and who:

1. may never have considered applying this knowledge to plants,
2. have always dreamed of this field of study, and/or
3. have always had an interest in plants but are uncertain that this field of study is right for them.

Studying plant biology will allow students to explore and understand plants at molecular, cellular, physiological, organismal, population, and community levels and by taking ecological, evolutionary, agricultural, and horticultural perspectives. This is accomplished through required courses in different scientific fields (e.g., biology, biochemistry, chemistry, agronomy, horticulture) and through different options in the major (ecology and management option and biotechnology option).

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 student’s academic and career objectives.

A research project initiated by the beginning of the junior year is required.

College Requirements

College Admission

College Admission

The entrance requirements for the College of Arts and Sciences are the same as the UNL General Admission Requirements. Students who are admitted through the Admission by Review process may have certain conditions attached to their enrollment at UNL. These conditions are explained under “Removal of Deficiencies.”

In addition to these requirements, the College of Arts and Sciences strongly recommends a third and fourth year of languages. Four years of high school language will exempt students from the College of Arts and Sciences’ language requirement. It will also allow students to continue language study at a more advanced level, and give more opportunity to study abroad.

Transfer Students

To be considered for admission as a transfer student, Nebraska resident or nonresident, students 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 graduated from high school January 1997 and after must also meet the UNL General Admissions Requirements. Those transfer students who graduated before January 1997 must have completed in high school 3 years of English, 2 years of the same foreign language, 2 years of algebra, and 1 year of geometry. Transfer students who have completed less than 12 credit hours of college study must submit either the ACT or SAT scores.

Ordinarily, hours 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 the University will accept on transfer from a two-year college or international institution. Transfer credit in the major or minor must be approved by the departmental advisor on a Request for Substitution Form to meet specific course requirements, group requirements, or course level requirements in the major or minor. At least half of the hours in the major field must be completed at the University regardless of the number of hours transferred.

The College of Arts and Sciences will accept no more than 15 semester hours of C- and D grades from other schools. The C- and D grades cannot be applied toward requirements for a major or minor. This policy does not apply to the transfer of grades from UNO or UNK to UNL. All D grades may be transferred from UNO or UNK, but they are not applicable to a major or minor.

Readmitted Students

Students readmitted to the College of Arts and Sciences will follow the requirements stated in the bulletin for the academic year of readmission and reenrollment as a degree-seeking student in Arts and Sciences. In consultation with advisors, a student may choose to follow a bulletin for any academic year in which they are admitted to and enrolled as a degree-seeking student at UNL in the College of Arts and Sciences. Students must complete all degree requirements from a single bulletin year. Beginning in 1990-1991, the bulletin which a student follows for degree requirements may not be more than 10 years old at the time of graduation.

Admission Deficiencies/Removal of Deficiencies

Students must remove entrance deficiencies in geometry and foreign language before graduating from the College of Arts and Sciences and should consult a college advisor in the Academic and Career Advising Center in 107 Oldfather Hall for questions about admission deficiencies.

Removing Foreign Language Deficiencies

Students must complete the second semester of the first year language sequence to clear the deficiency and the second semester of the second year language sequence to complete the college graduation requirement in language.

Removing Geometry Deficiencies

A deficiency of one year of geometry can be removed by taking two high school geometry courses by Independent Study or by completing a geometry course from an accredited community college or a four-year institution. Neither of these options count for college credit.

College Degree Requirements

College General Education Requirements

The College of Arts and Sciences distribution requirements are designed to further the purposes of liberal education by encouraging study in several different areas. Courses satisfying these requirements may impart specialized knowledge or broadly connect the subject matter to other areas of knowledge.

All requirements are in addition to University ACE requirements. A student may not use a single course to satisfy more than one of the
following five distribution requirements. A student cannot use a single course to satisfy both an ACE outcome and a College distribution requirement. A student cannot use a course from their major to satisfy the Breadth Requirement (F), but may apply an ancillary requirement of the primary major or a course from their second major toward this requirement. Independent study or reading courses and internships cannot be used to satisfy distribution requirements. To see a complete list of excluded courses, run a degree audit through MyRED.

Courses from interdisciplinary programs will count in the same area as courses from the home/cross-listed department(s).

**Bachelor of Arts or Bachelor of Science (16 credits + Language)**

A. **Written Communication**: 3 hours
   
   To be selected from courses approved for ACE outcome 1.

B. **Natural, Physical and Mathematical Sciences**: 4 hours

   Select from biochemistry, biological sciences, chemistry, computer science, geology, meteorology, mathematics, physics and statistics. Must include one lab in the natural or physical sciences. Lab courses may be selected from biochemistry, biological sciences, chemistry, geology, meteorology and physics. Select courses from geography\(^1\) and anthropology* may also be used to satisfy the lab requirement.

C. **Humanities**: 3 hours

   Select from: classics\(^2\), English, history, modern languages and literatures\(^2\), philosophy, and religious studies\(^2\).

D. **Social Sciences**: 3 hours

   Select from: anthropology\(^2\), communication studies, geography\(^3\), political science, psychology\(^3\), or sociology.

E. **Languages Classical and Modern**: 0-6 hours

   Fulfilled by the completion of the 6-credit-hour second-year sequence in a single foreign language in one of the following departments: Classics and religious studies, modern languages and literatures, or anthropology. Instruction is currently available in Arabic, Chinese, Czech, French, German, Greek, Japanese, Latin, Omaha, Russian, and Spanish. A student who has completed the fourth-year level of one foreign language in high school is exempt from the languages requirement.

F. **Additional Breadth Requirement (may not be used toward the primary major; may apply toward ancillary requirements and second majors)**: 3 hours

   Select from: natural, physical and mathematical sciences (Area B), humanities (Area C), or social sciences (Area D).

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1. **See your degree audit or a College of Arts and Sciences advisor for approved geography and anthropology courses that apply as natural science.**

2. **Language courses numbered 210 or below apply only for the foreign language requirement.**

3. **See degree audit or College of Arts and Sciences advisor for list of natural/physical science courses in anthropology, geography, and psychology that do not apply as social science.**

**Scientific Base**

The bachelor of science degree requires students to complete 60 hours in mathematical, physical and natural sciences. Approved courses for scientific base credit come from the following College of Arts and Sciences disciplines: actuarial science, anthropology (selected courses), astronomy, biochemistry (excluding BIOC 101 Career Opportunities in Biochemistry), biological sciences (excluding CASC 160 Introduction to Dentistry and Dental Hygiene, BIOS 160 Introduction to Clinical Laboratory Science, BIOS 203 Bioethics), chemistry (excluding CHEM 101 Career Opportunities in Chemistry), computer science (excluding CSCE 10 Introduction to CSE), geography (selected courses), geology, life sciences, mathematics (excluding courses below MATH 104 Applied Calculus), meteorology, physics and statistics.

See your degree audit or a College of Arts and Sciences advisor for a complete list including individual classes that fall outside of the disciplines listed above. Up to 12 hours of scientific and technical courses offered by other colleges may be accepted toward this requirement with approval of a college advisor.

**Foreign Languages/Language Requirement**

**Languages Exemption Policy**

UNL and the College of Arts and Sciences will exempt or waive students from the UNL entrance requirement of two years of the same foreign language or from the College’s language distribution requirement based on documentation only. The following are the options and procedures for documentation:

**High School Transcripts**

1. For the University entrance requirements, students must show an official high school transcript with two or more years of the same foreign language in high school.

2. For the College of Arts and Sciences College Distribution Requirement E-Language, students must show an official high school transcript with four or more years of the same foreign language in high school, or show evidence of graduation from a non-English-speaking foreign high school.

3. For the College of Arts and Sciences College Distribution Requirement E-Language, students whose native language is not English must show English as a Second Language study on an official high school transcript. Four years of ESL at the high school level (9th, 10th, 11th and 12th grades) will be the basis for a waiver of the CDR E Language requirement.

**Proficiency Examination at UNL**

1. For the University entrance requirements, students who do not have transcript documentation can request to take a proficiency exam in the language. (This is not the same test as the Modern Languages Placement Exam.) However, UNL will provide testing only in the languages it teaches. Currently, these languages are:

   - Arabic
   - French
   - German
   - Spanish
   - Russian
   - Czech
   - Japanese
   - Chinese

   The Department of Modern Languages will oversee the test and provide written documentation to the Arts and Sciences Advising Center that the student has passed the proficiency test at the 102 level.

2. For the College of Arts and Sciences College Distribution Requirement E-Language, the Department of Modern Languages will oversee the test at the 202 level. If the student passes the test, the department will sign the College Request for Waiver form and indicate the level of proficiency. The form is then forwarded to the Arts and Sciences Advising Center for approval.
Distance Education

1. For the University entrance requirement, students without transcript documentation who claim proficiency in a language not taught at UNL have the option of seeking out a distance education program in languages. If the student completes the equivalent of 102 from an approved distance education program, the student will meet the UNL entrance requirement. The student must have the course work approved before he/she takes/completes the course as equivalent to 102 by a College advisor. The student then completes the course and has the distance education program send the transcript to the Admissions Office.

2. For the College of Arts and Sciences College Distribution Requirement E-Language, the student can seek out a distance education program and complete the equivalent of the 202-level course. The student must submit the request on the College Request for Substitution form and have the course work approved by a College advisor. The student then completes the course and has the distance education program send the transcript to the Admissions Office.

Third Language Option

If a student demonstrates knowledge of two foreign languages at the 102 level, the College of Arts and Sciences may consider waiving two semesters of the four semester College Distribution Requirements E-Languages requirement. If this waiver were granted, the student would then be required to complete 101 and 102 in another (3rd language) at UNL.

Minimum Hours Required for Graduation

A minimum of 120 semester hours of credit is required for graduation from the College of Arts and Sciences. A total grade point average of at least 2.0 is required.

Grade Rules

Restrictions on C- and D Grades

The College will accept no more than 15 semester hours of C- and D grades from other schools except for UNO and UNK. No transfer C- and D grades can be applied toward requirements in a major or a minor. No UNL C- and D grades can be applied toward requirements in a major or a minor.

Pass/No Pass Privilege

University regulations for the Pass/No Pass (P/N) privilege state:

- The Pass/No Pass option is designed for your use by seeking to expand your intellectual horizons by taking courses in areas where you may have had minimal preparation.

For students in Arts and Sciences, the University regulations for Pass/No Pass apply as follows:

- Neither the P nor the N grade contribute to your GPA.
- P is interpreted to mean C or above.
- A change to or from a Pass/No Pass may be made until mid-term (1/2 of the course).
- The Pass/No Pass or grade registration cannot conflict with the policy of the professor, department, college, or University governing the grading option.
- Changing to or from Pass/No Pass requires using the MyRED system to change the grading option or filing a Drop/Add form with the Office of the University Registrar, 107 Canfield Administration Building. After mid-term of the course, a student registered for Pass/No Pass cannot change to a grade registration unless the Pass/No Pass registration is in conflict with the policy of the professor, department, college, or University governing Pass/No Pass.

- The Pass/No Pass grading option cannot be used for the removal of C- or D or F grades.

Pass/No Pass privileges in the College of Arts and Sciences are extended to students according to the following additional regulations:

- Pass/No Pass hours can count toward fulfillment of University ACE requirements and college distribution requirements up to 24-hour maximum.
- Many Arts and Sciences departments and programs do not allow courses in the major or minor to be taken Pass/No Pass; students should refer to the department’s or program’s section of the bulletin for clarification. By college rule, departments can allow up to 6 hours of Pass/No Pass in the major or minor.
- Departments may specify that certain courses of theirs can be taken only on a P/N basis.
- The college will permit no more than a total of 24 semester hours of P/N grades to be applied toward degree requirements. This total includes all Pass grades earned at UNL and other U.S. schools. **Note:** This 24-hour limit is more restrictive than the University regulation.

Students who wish to apply P/N hours to their major and minor(s) must obtain approval on a form that is available in the Arts and Sciences Advising Center, 107 Oldfather Hall.

Grading Appeals

A student who feels that he/she has been unfairly graded must ordinarily take the following sequential steps in a timely manner, usually by initiating the appeal in the semester following the awarding of the grade:

1. Talk with the instructor concerned. Most problems are resolved at this point.
2. Talk to the instructor’s department chairperson.
3. Take the case to the Grading Appeal Committee of the department concerned. The Committee should be contacted through the department chairperson.
4. Take the case to the College Grading Appeals Committee by contacting the Dean’s Office, 1223 Oldfather Hall.

Course Level Requirements

Courses Numbered above 299

Thirty of the 120 semester hours of credit must be in courses numbered above 299. Of the 30 hours above 299, 15 hours (1/2) must be completed in residence at UNL. **Note:** ALEC 397E and ALEC 397K do not count toward these 30 hours.

Graduate Courses

Seniors in the University who have obtained in advance the approval of the dean for Graduate Studies may receive up to 12 hours credit for graduate courses taken in addition to the courses necessary to complete their undergraduate work, provided that such credits are earned within the calendar year prior to receipt of the baccalaureate. For procedures, inquire at the Office of Graduate Studies.

Course work taken prior to receipt of the baccalaureate may not always be accepted for transfer to other institutions as graduate work.

Residency

Residency Requirement and Open Enrollment and Summer Independent Study Courses

Students must complete at least 30 of the 120 total hours for their degree at UNL. Students must complete at least 1/2 of their major course work including 6 hours above 299 in their major, and 15 of the 30 hours required above 299 in residence. 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.

**ACE Requirements**
Consistent with the mission and values of the University, ACE is based on a shared set of four institutional objectives and 10 student learning outcomes. The ACE program was approved by faculty in all eight undergraduate colleges and endorsed by the Faculty Senate, the student government, and the Academic Planning Committee in January 2008 for implementation in the fall 2009. ACE aligns with current national initiatives in general education.

Key characteristics of ACE demonstrate the benefits of the program to students:

- Students receive a broad education with exposure to multiple disciplines, critical life skills and important reasoning, inquiry, and civic capacities.
- ACE is simple and transparent for students, faculty and advisors. Students complete the equivalent of 3 credit hours for each of the ten student learning outcomes.
- Students connect and integrate their ACE experiences with their selected major.
- Students can transfer all ACE certified courses across colleges within the institution to meet the ACE requirement and any course from outside the institution that is directly equivalent to a UNL ACE-certified course. Courses from outside institutions without direct equivalents may be considered with appropriate documentation for ACE credit (see academic advisor).

ACE allows faculty to assess and improve their effectiveness and facilitate students’ learning.

**ACE Institutional Objectives and Student Learning Outcomes**
To meet the ACE Program requirement, a student will complete a minimum of 3 credit hours for each of the ten ACE Student Learning Outcomes (a total of 30 ACE credit hours). See the ACE website at: http://ace.unl.edu for the most current information and the most recently certified courses.

**Bulletin Rule**
Students must fulfill the requirements stated in the bulletin for the academic year in which they are first admitted to and enrolled as a degree-seeking student at UNL. In consultation with advisors, a student may choose to follow a subsequent bulletin for any academic year in which they are admitted to and enrolled as a degree-seeking student at UNL in the College of Arts and Sciences. Students must complete all degree requirements from a single bulletin year. Beginning in 1990-1991 the bulletin which a student follows for degree requirements may not be more than 10 years old at the time of graduation.

**Learning Outcomes**
Majors in 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

#### Core Requirements

**Mathematics and Statistics**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 106</td>
<td>Calculus I</td>
<td>5</td>
</tr>
<tr>
<td>STAT 218</td>
<td>Introduction to Statistics</td>
<td>3</td>
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</tbody>
</table>

Credit Hours Subtotal: 8

**Life Sciences**

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<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
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<tbody>
<tr>
<td>LIFE 120</td>
<td>Fundamentals of Biology I</td>
<td>4</td>
</tr>
<tr>
<td>LIFE 120L</td>
<td>Fundamentals of Biology I laboratory</td>
<td>4</td>
</tr>
<tr>
<td>LIFE 121</td>
<td>Fundamentals of Biology II</td>
<td>4</td>
</tr>
<tr>
<td>LIFE 121L</td>
<td>Fundamentals of Biology II laboratory</td>
<td>4</td>
</tr>
</tbody>
</table>

Credit Hours Subtotal: 8

**Chemistry**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>CHEM 109</td>
<td>General Chemistry I</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 110</td>
<td>General Chemistry II</td>
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**Biochemistry**

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<tbody>
<tr>
<td>BIOC 321</td>
<td>Elements of Biochemistry</td>
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<tr>
<td>BIOC 321L</td>
<td>Laboratory for Elements of Biochemistry</td>
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Credit Hours Subtotal: 4

**Plant Biology Core**

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<thead>
<tr>
<th>Course</th>
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</thead>
<tbody>
<tr>
<td>BIOS 109</td>
<td>General Botany</td>
<td>4</td>
</tr>
<tr>
<td>or AGRO 131</td>
<td>Plant Science</td>
<td></td>
</tr>
<tr>
<td>or AGRO 132</td>
<td>and Agronomic Plant Science Laboratory</td>
<td>4</td>
</tr>
<tr>
<td>or HORT 131</td>
<td>Plant Science</td>
<td></td>
</tr>
<tr>
<td>or HORT 133</td>
<td>and Horticultural Plant Science Laboratory</td>
<td>4</td>
</tr>
<tr>
<td>NRES 220 /</td>
<td>Principles of Ecology</td>
<td>4</td>
</tr>
<tr>
<td>BIOS 220</td>
<td>and Ecology Laboratory</td>
<td></td>
</tr>
<tr>
<td>&amp; NRES 222</td>
<td></td>
<td></td>
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<tr>
<td>&amp; BIOS 222</td>
<td></td>
<td></td>
</tr>
<tr>
<td>or BIOS 207</td>
<td>Ecology and Evolution</td>
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**AGRO**

<table>
<thead>
<tr>
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<tr>
<td>AGRO 153 /</td>
<td>Soil Resources</td>
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<tr>
<td>HORT 153 /</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SOIL 153</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AGRO 215 /</td>
<td>Genetics</td>
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</tr>
<tr>
<td>HORT 215 /</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TLMT 215</td>
<td></td>
<td></td>
</tr>
<tr>
<td>or BIOS 206</td>
<td>General Genetics</td>
<td>4</td>
</tr>
</tbody>
</table>

**AGRO 325**

Introduction to Plant Physiology | 4
Plant Biology Portfolio and Assessment

Credit Hours Subtotal: 0

Plant Biology Internship/Career Experience

Select one of the following:

1. BIOS 395 Internship
2. HORT 395 / TLMT 395 Career Experience
3. AGRO 295 / RNGE 295 / SOIL 295 Internship in Agronomy
4. NRES 497 Career Experiences in Natural Resource Sciences

Credit Hours Subtotal: 1

Plant Biology Independent Study/Current Project

Select one of the following:

1-3

1. BIOS 498 Independent Research in Biological Sciences
2. AGRO 496 / RNGE 496 / SOIL 496 Independent Study
3. HORT 396 Current Projects and Topics in Horticulture or HORT 399 Independent Study
4. NRES 496 Independent Study
5. PLPT 496 Independent Study

Credit Hours Subtotal: 1-3

Total Credit Hours 54-56

Specific Major Requirements

Select either the Ecology and Management Option or the Biotechnology Option as described below.

Ecology and Management Option

Required Courses

3-4

1. AGRO 245 / NRES 245 / or NRES 310 Introduction to Grassland Ecology and Management
2. AGRO 444 / NRES 444 / RNGE 444 Ecosystem Monitoring and Assessment

Credit Hours Subtotal: 6-7

Additional Ecology and Management Option Courses

Select at least three (3) hours from each of the following five (5) areas:

Water/Climate

Select at least 3 hours from the following:

3-4

1. METR 100 Weather and Climate
2. NRES 208 Applied Climate Sciences
3. NRES 408 / AGRO 408 / GEOG 408 / HORT 408 / METR 408 / WATS 408 Microclimate: The Biological Environment
4. WATS 281 / GEOG 281 / NRES 281 Introduction to Water Science

Geospatial Information Sciences

Select at least 3 hours from the following:

3-4

1. GEOG 412 / NRES 412 Introduction to Geographic Information Systems
2. GEOG 418 / NRES 418 Introduction to Remote Sensing
3. NRES 312 / GEOG 312 Introduction to Geospatial Information Sciences

Plant Identification

3

1. AGRO 442 / NRES 442 / RNGE 442 Wildland Plants

Plant-Animal-Organismal Interactions

Select at least 3 hours from the following:

3-4

1. AGRO 340 / RNGE 340 Range Management and Improvement
2. AGRO 460 / NRES 460 Soil Microbiology
3. AGRO 447 / NRES 460 / SOIL 460 Soil Microbiology
4. BIOS 317 / NRES 460 The Biology of Plants
5. BIOS 475 / NRES 475 Avian Biology
6. BIOS 476 / NRES 476 Mammalogy
7. ENT 115 / NRES 476 Insect Biology & ENT 116 and Insect Identification
8. NRES 211 / NRES 311 / NRES 348 Introduction to Conservation Biology / Wildlife Ecology and Management / Wildlife Damage Management

Ecology and Management

Select at least 3 hours from the following:

3-4

1. AGRO 204 / RNGE 240 Resource-Efficient Crop Management
2. AGRO 240 / RNGE 240 Forage Crop and Pasture Management
3. AGRO 440 / NRES 440 / RNGE 440 Great Plains Ecosystem
4. BIOS 454 / NRES 454 Ecological Interactions
5. BIOS 457 / GEOL 457 Ecosystem Ecology
6. BIOS 470 Prairie Ecology
7. HORT 130 Introduction to Horticulture Science
8. NRES 310 Introduction to Forest Management
9. NRES 417 / HORT 418 Agroforestry Systems in Sustainable Agriculture
10. NRES 424 / HORT 420 Forest Ecology
11. NRES 459 / WATS 459 Limnology
12. NRES 468 / WATS 458 / WATS 459 Wetlands
Credit Hours Subtotal: 15
Total Credit Hours 21-22

Biotechnology Option

Required Courses
BIOS 312 Microbiology 3
BIOS 237 Basic Applications of Bioinformatics 3-4
or BIOC 442 Computational Biology
or BIOS 427 Practical Bioinformatics Laboratory

Credit Hours Subtotal: 6-7

Additional Biotechnology Courses
Select at least seventeen (17) hours from the following areas with at least three (3) hours in each area:

Biological Sciences
Select at least 3 hours from the following: 3-6
AGRO 460 Soil Microbiology
AGRO 270 Biological Invaders
BIOS 205 Genetics, Molecular and Cellular Biology Laboratory
BIOS 302 Cell Biology
BIOS 317 The Biology of Plants
BIOS 407 Biology of Cells and Organelles
BIOS 418 Advanced Genetics
BIOS 420 Molecular Genetics
BIOS 425 Plant Biotechnology
BIOS 471 Plant Systematics
BIOS 477 Bioinformatics and Molecular Evolution

Applied Plant Biology
Select at least 3 hours from the following: 3-6
AGRO 131 Plant Science
& AGRO 132 and Agronomic Plant Science Laboratory
AGRO 131 Plant Science
& HORT 133 and Horticultural Plant Science Laboratory
AGRO 408 Microclimate: The Biological Environment
AGRO 411 Crop Genetic Engineering
AGRO 412 Crop and Weed Genetics
HORT 221 Plant Propagation
NRES 406 / AGRO 406 Plant Ecophysiology: Theory and Practice
PLPT 369 Introductory Plant Pathology

Plant and Food System Management
Select at least 3 hours from the following: 3-6
AGRO 204 Resource-Efficient Crop Management
AGRO 240 Forage Crop and Pasture Management
or AGRO 227 Introduction to Turfgrass Management
AGRO 405 Crop Management Strategies
or AGRO 435 Agroecology
AGRO 426 Invasive Plants
AGRO 437 Animal, Food and Industrial Uses of Grain
AGRO 438 Producing Grain for Animal, Food and Industrial Uses

ENTO 115 / BIOS 115 & ENTO 116 Insect Biology and Insect Identification
FDST 205 Food Composition and Analysis
HORT 325 Greenhouse Practices and Management
HORT 352 Production and Physiology of Horticultural Crops
HORT 355 Perennial, Pot and Bedding Plant Production Laboratory
HORT 462 Nursery Management and Crop Production

Credit Hours Subtotal: 17
Total Credit Hours 23-24

1 Students considering graduate school should also take BIOS 478 Plant Anatomy.

Additional Major Requirements

Grade Rules
C- and D Grades
A grade of C or better is required in all courses in the major or minor.

Pass/No Pass
No course taken Pass/No Pass will count toward the major or minor, except for the Career Experience courses.

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

Requirements
AGRO 131 / HORT 131 Plant Science 3
AGRO 132 Agronomic Plant Science Laboratory 1
or HORT 133 Horticultural Plant Science Laboratory
AGRO 325 Introductory Plant Physiology 4
BIOS 109 General Botany 4

Credit Hours Subtotal: 12

Focus
Select either the Biotechnology Focus or Ecology and Management Focus 7-8

Biotechnology Focus
AGRO 215 / HORT 215 / TLMT 215 Genetics
or BIOS 206 General Genetics
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
BIOS 222 / Ecology Laboratory
NRES 222
Any 300 or 400 level course listed under the Plant Biology Major Ecology and Management Option
Credit Hours Subtotal: 7-8
Total Credit Hours 19-20

Grade Rules
C- and D Grades
A grade of C or better is required in all courses in the major or minor.

Pass/No Pass
No course taken Pass/No Pass will count toward the major or minor, except for the Career Experience courses.

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

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

Transferable Skills
- Comprehend and critically evaluate complex information
- Use quantitative analytical computational techniques
- Make predictions using mathematical, statistical, and scientific modeling methods
- Understand and use proper laboratory and technical skills and instruments
- Define problems and identifying causes
- More...
  - Support and communicate claims using clear evidence
  - Simplify complex information and present it to others
  - Apply mathematical and scientific skills to solve real-world problems
  - Document and replicate processes and procedures
  - Design and implement research experiments