INSECT SCIENCE

Description
Website: http://entomology.unl.edu/insect_science/index.shtml

The field of insect science encompasses the agricultural, biological, and environmental sciences related to insects and their interactions with humans. Insects and their relatives are the most abundant animals on earth, are commonly found in all habitats, and are essential in maintaining our ecosystem. Insect Science offers numerous career opportunities in both basic and applied fields.

The core curriculum provides students with a balanced education focusing on insect identification, biology, structure and function, behavior, ecology, and diversity, as well as courses in mathematics, science, and the humanities. In addition to the core, there are two options from which students can select an area of focus which meets their own interest and career objectives.

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 specific 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 bachelor's 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 (withdraw), 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 (>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, M BIO, ENVIR, 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 insect science will be able to:

1. Demonstrate a broad range of knowledge and understanding of insect biology, physiology, classification, ecology and behavior, and insect pest management.
2. Apply content knowledge to solve problems, both theoretical and practical.
3. Communicate through writings and oral presentations, complex ideas and develop sound arguments based on technical knowledge.
4. Conduct original research that includes developing a hypothesis, designing appropriate experiments, collecting and analyzing data, interpreting results, and drawing conclusions.

Major Requirements
Core Requirements
The following basic courses are required for majors in insect science. In addition, students must select and meet the requirements of one of the options, depending on their own individual interests and career objectives.

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.

College Integrative Course
<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCIL 101</td>
<td>Science and Decision-Making for a Complex World</td>
<td>3</td>
</tr>
<tr>
<td>ENTO 485</td>
<td>Current Issues in Entomology (ACE 10)</td>
<td>3</td>
</tr>
</tbody>
</table>

Credit Hours Subtotal: 6

Departmental Requirements
<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENTO 115</td>
<td>Insect Biology</td>
<td>3</td>
</tr>
<tr>
<td>BIOS 115</td>
<td>Insect Identification</td>
<td>1</td>
</tr>
<tr>
<td>ENTO 400</td>
<td>Biology and Classification of Insects</td>
<td>4</td>
</tr>
</tbody>
</table>

Credit Hours Subtotal: 8

Experiential Learning for Career Development in Insect Science
Select 5 credits from the following categories:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENTO 309</td>
<td>Career Experience</td>
<td>5</td>
</tr>
<tr>
<td>ENTO 395A</td>
<td>Experiential Learning for Career Experience (Arranged through advisor)</td>
<td>5</td>
</tr>
</tbody>
</table>

Experiential Learning for Career Development in Insect Science Teaching Experience (Arranged through advisor) 5

Mathematics and Statistics (beyond college algebra) (ACE 3)
Select 5 credits of the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
</table>

Credit Hours Subtotal: 5
### MATH Courses
- **MATH 102**: Trigonometry
- **MATH 103**: College Algebra and Trigonometry
- **MATH 104**: Applied Calculus
- **MATH 106**: Calculus I
- **STAT 218**: Introduction to Statistics

**Credit Hours Subtotal:** 5

### Communication

**Written Communication (ACE 1)**
Select one of the following: 3
- **ENGL 150**: Writing and Inquiry
- **ENGL 151**: Writing and Argument
- **ENGL 254**: Writing and Communities
- **JGEN 120**: Basic Business Communication
- **JGEN 200**: Technical Communication I

**Communications and Interpersonal Skills (ACE 2)**
Select one of the following: 3
- **ALEC 102**: Interpersonal Skills for Leadership
- **COMM 109**: Fundamentals of Human Communication
- **COMM 209**: Public Speaking
- **COMM 286**: Business and Professional Communication
- **JGEN 300**: Technical Communication II

**Credit Hours Subtotal:** 6

### Natural Sciences

**CASNR Approved Life Sciences (ACE 4)**
Select one sequence of the following: 4
- **BIOS 101** & **BIOS 101L**: General Biology and General Biology Laboratory
- **LIFE 120** & **LIFE 120L**: Fundamentals of Biology I and Fundamentals of Biology I Laboratory
- **CHEM 109**: General Chemistry I
- **BIOS 206**: General Genetics
- **or AGRO 215**: Genetics

**Credit Hours Subtotal:** 12

### Economics, Humanities and Social Sciences

Select one of the following: 3
- **ECON 211**: Principles of Macroeconomics
- **ECON 212**: Principles of Microeconomics
- **AECN 141**: Introduction to the Economics of Agriculture (ACE 6)

Select one course each from ACE outcomes 5, 7, 8, and 9: 12

**Credit Hours Subtotal:** 15

### Option Requirements

Complete requirements: 42-44

**Credit Hours Subtotal:** 42

### Free Electives

Select 19-21 credits: 19-21

**Credit Hours Subtotal:** 21

**Total Credit Hours** 120

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1. Maximum of 3 hours from any one category.

2. Proficiency at the college algebra level must be demonstrated either by a placement exam or through course work. If MATH 103 College Algebra and Trigonometry is taken, only 2 cr hrs can be counted toward this requirement.

### IPM and Pest Science Option

The IPM and Pest Science Option is designed for students considering careers in agriculture, agribusiness, consulting (agricultural, environmental, public health, urban), extension, state and federal government agencies (e.g., APHIS, EPA, USDA, and state departments of agriculture), horticulture, the military, food processing, and pest control. Examples of areas of focus include agronomic and horticultural pests, or urban pests. This option is also suitable as preparation for graduate studies leading to academic or research careers in applied entomology.

#### Departmental Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENTO 300 /</td>
<td>Toxins in the Environment</td>
<td>3</td>
</tr>
<tr>
<td>BIOS 300 /</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NRES 300</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENTO 401</td>
<td>Insect Physiology</td>
<td>3</td>
</tr>
<tr>
<td>ENTO 406 /</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOS 406</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENTO 412</td>
<td>Entomology and Pest Management</td>
<td>3</td>
</tr>
</tbody>
</table>

Select three of the following: 8-9
- **ENTO 109**: Beekeeping
- **ENTO 403**: Management of Horticultural Crop Insects
- **ENTO 308**: Management of Field Crop Insects
- **ENTO 409**: Insect Control by Host-Plant Resistance
- **ENTO 415**: Medical Entomology

**Credit Hours Subtotal:** 20-21

### Other Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGRI 115</td>
<td>Biotechnology: Food, Health and Environment</td>
<td>3</td>
</tr>
<tr>
<td>AGRO 153 /</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HORT 153 /</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SOIL 153</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AGRO 426 /</td>
<td>Invasive Plants</td>
<td>3</td>
</tr>
<tr>
<td>HORT 426 /</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NRES 426</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NRES 211</td>
<td>Introduction to Conservation Biology</td>
<td>3</td>
</tr>
<tr>
<td>NRES 220 /</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOS 220</td>
<td>Principles of Ecology and Ecology Laboratory</td>
<td>4</td>
</tr>
<tr>
<td>NRES 222 /</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOS 222</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PLPT 270 /</td>
<td>Biological Invaders</td>
<td>3</td>
</tr>
<tr>
<td>AGRO 270 /</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HORT 270 /</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NRES 270</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PLPT 369 /</td>
<td>Introductory Plant Pathology</td>
<td>3</td>
</tr>
<tr>
<td>BIOS 369</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Credit Hours Subtotal:** 23

**Total Credit Hours** 43-44

### Science Option

The Insect Science Option is designed for students interested in careers focusing on the basic biology of insects and other arthropods. This option is suitable for students considering any career involving
entomology (e.g., academia, research, medicine, forensics, environmental quality, conservation biology, or health-related fields), but is especially appropriate preparation for entry into professional programs such as veterinary and medical schools and with many graduate school disciplines. Students pursuing this option must choose LIFE 120 Fundamentals of Biology I & LIFE 120L Fundamentals of Biology I laboratory and BIOS 206 General Genetics in meeting the entomology degree requirements in life sciences. Completion of the Insect Science Option will also fulfill requirements for a minor in biological sciences.

### Departmental Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENTO 401</td>
<td>Insect Physiology</td>
<td>3</td>
</tr>
<tr>
<td>ENTO 406 / BIOS 406</td>
<td>Insect Ecology</td>
<td>3</td>
</tr>
</tbody>
</table>

Select 6 credits from any ENTO course beyond those meeting other major requirements

Credit Hours Subtotal: 12

### Other Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGRI 115</td>
<td>Biotechnology: Food, Health and Environment</td>
<td>3</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></td>
</tr>
<tr>
<td>BIOS 205</td>
<td>Genetics, Molecular and Cellular Biology Laboratory</td>
<td>2</td>
</tr>
<tr>
<td>BIOS 207</td>
<td>Ecology and Evolution</td>
<td>4</td>
</tr>
</tbody>
</table>

Select 2 credits from any BIOS/LIFE course beyond those meeting other major requirements

Credit Hours Subtotal: 12

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOC 321</td>
<td>Elements of Biochemistry</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 321L</td>
<td>Laboratory for Elements of Biochemistry</td>
<td></td>
</tr>
<tr>
<td>CHEM 110</td>
<td>General Chemistry II</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 251</td>
<td>Organic Chemistry I</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 141</td>
<td>Elementary General Physics I</td>
<td>4-5</td>
</tr>
<tr>
<td>PHYS 151</td>
<td>Elements of Physics</td>
<td></td>
</tr>
</tbody>
</table>

Total Credit Hours 42-43

Students interested in graduate or professional schools in biology, medicine, or veterinary science should take:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 106</td>
<td>Calculus I</td>
<td>5</td>
</tr>
<tr>
<td>PHYS</td>
<td>An additional PHYS course and lab</td>
<td>5</td>
</tr>
</tbody>
</table>

### Requirements for Minor Offered by Department

#### Insect Science Minor

A minor in insect science will consist of at least 18 credit hours of entomology including at least 6 hours at the 300 level or above. BIOS 381 Invertebrate Zoology, and up to 3 hours of ENTO 496 Independent Study in Entomology, may be counted towards the minor requirements. The course of study leading to a minor in insect science must be developed in consultation with, and be approved by, an advisor in the Department of Entomology. Advisors for the minor are assigned by the Head of the Department of Entomology.

**ENTO 109 Beekeeping**

**Description:** Life history and habits of the honeybee; methods of management; honey and wax production; apiary equipment; pollination; identity and control of bee diseases.

**Credit Hours:** 2

**Max credits per semester:** 2

**Max credits per degree:** 2

**Format:** LEC

**Prequisite for:** ENTO 200; ENTO 400; FORS 411

**ACE:** ACE 4 Science

**ENTO 115 Insect Biology**

**Crosslisted with:** BIOS 115

**Description:** Fundamental insect biology (anatomy, development, physiology, behavior, ecology and diversity). Economic and medical importance of insects and principles of insect pest management.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Format:** LEC

**Prequisite for:** ENTO 200; ENTO 400; FORS 411

**ACE:** ACE 4 Science

**ENTO 116 Insect Identification**

**Crosslisted with:** BIOS 116

**Description:** Identification of representative orders and families of insects by their anatomy, metamorphosis, habits and habitats. Sight recognition emphasized but dichotomous keys also used. Interrelation of insect and habitats stressed.

**Credit Hours:** 1

**Max credits per semester:** 1

**Max credits per degree:** 1

**Format:** LAB

**Prequisite for:** FORS 411

**ENTO 200 Behavior of Arthropods**

**Prerequisites:** ENTO 115 or equivalent introductory course

**Description:** An in-depth look at how arthropods find and defend their resources, how they avoid predators, how they find mates, how they mate, and how some exist in highly ordered social settings.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Format:** LEC

**ENTO 300 Toxins in the Environment**

**Crosslisted with:** BIOS 300, NRES 300

**Prequisites:** One semester BIOS and one semester CHEM

**Description:** Introduction to the principles of toxicology as they apply to environmental contaminants, agri-chemicals, and industrial and naturally occurring chemicals.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Format:** LEC

**ENTO 308 Management of Field Crop Insects**

**Prerequisites:** BIOS 101 and 101L or permission; ENTO 115 recommended

**Description:** Injurious and beneficial insects and pest management practices associated with field crop insects and mites.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Format:** LEC

**ENTO 406 Insect Ecology**

**Crosslisted with:** ENTO 406 / BIOS 406

**Description:** A minor in insect science will consist of at least 18 credit hours of entomology including at least 6 hours at the 300 level or above.

**Credit Hours Subtotal:** 12

**Select 6 credits from any ENTO course beyond those meeting other major requirements**

**Credit Hours Subtotal:** 12

**Total Credit Hours:** 42-43

**Students interested in graduate or professional schools in biology, medicine, or veterinary science should take:**

<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 106</td>
<td>Calculus I</td>
<td>5</td>
</tr>
<tr>
<td>PHYS</td>
<td>An additional PHYS course and lab</td>
<td>5</td>
</tr>
</tbody>
</table>
ENTO 309 Career Experience
Prerequisites: Junior standing; introductory courses in entomology; and permission prior to enrolling
Notes: Course must be concluded with preparation of a written report. P/N only.
Description: Career experience in applied practices is provided via employment with an entomology-related agency, business or industry, research, extension, or teaching activity.
Credit Hours: 1-3
Min credits per semester: 1
Max credits per semester: 3
Max credits per degree: 4
Format: LEC

ENTO 315 Undergraduate Research Seminar
Description: A comprehensive introduction to research is covered in this course designed for, but not limited to, insect science majors preparing for their capstone experience. Students learn about the scientific method, methodologies used to conduct research (including utilizing the library for literature searches), and the process of scientific writing and presentation.
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 1
Format: LEC

ENTO 395 Experiential Learning for Career Development in Insect Science
Prerequisites: Sophomore standing.
Notes: A faculty adviser for the area of interest must be identified prior to registering for the course.
Description: Application and integration of the Insect Science curriculum within the context of extension and service, research, or teaching experience.
Credit Hours: 1-5
Min credits per semester: 1
Max credits per semester: 5
Max credits per degree: 5
Format: FLD

ENTO 395A Experiential Learning for Career Development in Insect Science Research Experience
Prerequisites: Sophomore standing.
Notes: A faculty adviser for the area of interest must be identified prior to registering for the course.
Description: Application and integration of the Insect Science curriculum within the context of extension and service, research, or teaching experience.
Credit Hours: 1-5
Min credits per semester: 1
Max credits per semester: 5
Max credits per degree: 5
Format: FLD

ENTO 395B Experiential Learning for Career Development in Insect Science Teaching Experience
Prerequisites: Sophomore standing.
Notes: A faculty adviser for the area of interest must be identified prior to registering for the course.
Description: Application and integration of the Insect Science curriculum within the context of extension and service, research, or teaching experience.
Credit Hours: 1-5
Min credits per semester: 1
Max credits per semester: 5
Max credits per degree: 5
Format: FLD

ENTO 395C Experiential Learning for Career Development in Insect Science Extension Experience
Prerequisites: Sophomore standing.
Notes: A faculty adviser for the area of interest must be identified prior to registering for the course.
Description: Application and integration of the Insect Science curriculum within the context of extension and service, research, or teaching experience.
Credit Hours: 1-5
Min credits per semester: 1
Max credits per semester: 5
Max credits per degree: 5
Format: FLD

ENTO 400 Biology and Classification of Insects
Prerequisites: ENTO 115 or graduate standing
Description: Survey of orders and common families of insects with emphasis on biology, ecology, and phylogeny. Sight recognition of major orders and families, identification of other families with keys. Insect collection required.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Format: LEC

ENTO 401 Insect Physiology
Crosslisted with: ENTO 801
Prerequisites: CHEM 251 or CHEM 255; 12 hrs entomology or biological sciences (zoology)
Description: Functions and other phenomena associated with the major organ systems of insects; the cuticle, nervous, circulatory, digestive, metabolism, nutrition, locomotion, reproduction, respiration, and growth and development.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

ENTO 402 Aquatic Insects
Crosslisted with: BIOS 485, BIOS 885, ENTO 802, NRES 402, NRES 802
Prerequisites: 12 hrs biological sciences
Description: Biology and ecology of aquatic insects.
Credit Hours: 2
Max credits per semester: 2
Max credits per degree: 2
Format: LEC
ENTO 402L Identification of Aquatic Insects
Crosslisted with: BIOS 485L, BIOS 885L, ENTO 802L, NRES 402L, NRES 802L
Prerequisites: Parallel ENTO 802, NRES 402/802, BIOS 485/885.
Description: Identification of aquatic insects to the family level.
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 1
Format: LAB

ENTO 403 Management of Horticultural Crop Insects
Crosslisted with: ENTO 803
Prerequisites: Introductory biology course.
Description: The biology, ecology and management of insect pests of horticultural crops such as vegetables, fruit trees, trees and shrubs, greenhouse crops, turf and ornamentals. Employing Integrated Pest Management (IPM) strategies to maintain pests below damaging levels while minimizing the use of traditional insecticides.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

ENTO 406 Insect Ecology
Crosslisted with: BIOS 406, BIOS 806, ENTO 806
Prerequisites: BIOS/NRES 220 and 222.
Description: Biotic and abiotic factors as they influence insect development, behavior, distribution, and abundance.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

ENTO 409 Insect Control by Host-Plant Resistance
Crosslisted with: ENTO 809
Prerequisites: 12 hrs agricultural sciences and/or biological sciences including one course in entomology and one course in genetics.
Description: Explore resistance of crops to herbivorous arthropods. Investigate how insect behavior and physiology are affected by resistance, critically review current research on plant resistance genes, and the molecular, biochemical and physiological aspects of insect/microbe interactions with host plants.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

ENTO 411 Field Entomology
Crosslisted with: BIOS 482, BIOS 882, ENTO 811
Prerequisites: 12 hrs biological sciences.
Description: Field course in insect taxonomy and biology emphasizing field collection, specimen preparation, classification, and insect natural history.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Format: LEC

ENTO 412 Entomology and Pest Management
Crosslisted with: ENTO 812
Prerequisites: Introductory course in ENTO.
Description: Principles and practices of managing insects pests. Pest management theory, us of sampling, evaluation, tactics, types of insect pests, and current issues.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

ENTO 414 Forensic Entomology
Crosslisted with: ENTO 814, FORS 414, FORS 814
Prerequisites: Introductory course in entomology
Description: Application of entomology to legal issues. Criminal investigations, insects of forensic importance, insect succession on carrion, and case studies.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

ENTO 415 Medical Entomology
Crosslisted with: ENTO 815
Prerequisites: Introductory course in ENTO.
Description: Direct and indirect importance of insects in human medicine. Principles of arthropod-borne disease, medically important arthropod groups, and arthropod-transmitted diseases.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

ENTO 485 Current Issues in Entomology
Prerequisites: Senior standing; completion of ENTO core requirements.
Notes: Capstone course. Fulfills the capstone requirement for the insect science major.
Description: The application and integration of biological principles of the insect science program.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
ACE: ACE 10 Integrated Product

ENTO 495 Grasslands Seminar
Crosslisted with: AGRO 495, GRAS 495, HORT 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
**ENTO 496 Independent Study in Entomology**  
Crosslisted with: ENTO 896  
**Prerequisites:** 12 hrs biological sciences and/or agricultural sciences.  
**Notes:** Independent study contracts for ENTO 496/896 must be filed with the department.  
**Description:** Individual or group projects in research, literature review, or extension of course work.  
**Credit Hours:** 1-6  
**Min credits per semester:** 1  
**Max credits per semester:** 6  
**Max credits per degree:** 12  
**Format:** IND

**ENTO 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

**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.

### Insect Science - IPM & Pest Science

#### Icon Legend: Critical

#### 13 HR TERM 1

**College Course**

complete SCIL 101

3hr

SCIL 101 becomes critical to your success in the major if not completed by the second term of enrollment.

**Entomology Core**

complete ENTO 115, ENTO 116

4hr

**ACE 4 Life Science**

complete LIFE 120, LIFE 120L

4hr

**College Algebra Reqt**

complete MATH 102

**16 HR TERM 3**

**ACE 2 Oral Comm**

complete 1 from ALEC 102, COMM 101, COMM 109, COMM 209, COMM 286, JGEN 300

3hr

**Entomology Core**

complete 1 from ENTO 300, ENTO 401, ENTO 406, ENTO 412

3hr

**Pest Science Core**

complete PLPT 270
16 HR TERM 4

Pest Science Core
complete AGRO 153, AGRO 426

Entomology Electives
complete 1 from ENTO 308, ENTO 403, ENTO 409, ENTO 415

ACE 5 Humanities
complete 1 from ACE5

Electives
complete Any Course

14 HR TERM 5

Entomology Core
complete ENTO 400

ACE 7 Arts
complete 1 from ACE7

ACE 8 Ethical Principles
complete 1 from ACE8

Electives
complete Any Course

AGRI 388 is recommended for 1 of the 4 elective hours this term.

14 HR TERM 6

Pest Science Core
complete AGRI 115, NRES 220, NRES 222

ACE 9 Global/Human Divers
complete 1 from ACE9

Entomology Core
complete ENTO 406

Electives
recommend 1 or more courses

AGRI 400 is recommended for this term.

3 HR TERM 7

Entomology Core
complete ENTO 412

15 HR TERM 8

Entomology Core
complete ENTO 401

Pest Science Core
complete PLPT369#

Research Experience
complete ENTO 395A

Select a version of ENTO 395 for this term.

Entomology Electives
complete 1 from ENTO 308, ENTO 403, ENTO 409, ENTO 415
Insect Science - Science

16 HR TERM 1

College Course
complete SCIL 101

SCIL 101 becomes critical to your success in the major if not completed by the second term of enrollment.

College Algebra Reqt
complete MATH 106

15 HR TERM 2

ACE 1 Written
complete 1 from ENGL 150, ENGL 151, ENGL 254, JGEN 120, JGEN 200

ACE 6 Economics
complete AECN 141

Entomology Electives
complete Any Entomology Course at any Level

Science Option Core
complete 2 from LIFE 121L, LIFE 121L, LIFE 121

15 HR TERM 3

ACE 4 Chemistry
complete CHEM 109

ACE 2 Oral Comm
complete 1 from ALEC 102, COMM 101, COMM 109, COMM 209, COMM 286, JGEN 300

Science Option Core
complete BIOS 205

Graduation Requirements
1. Performance Measure: 2.00 GPA required for graduation.
2. ***Total Credits Applying Toward 120 Total Hours***
Genetics
complete BIOS 206

Electives
complete Any Course

14 HR TERM 4
Biochem/Chemistry/Physics
complete CHEM 110

Science Option Core
complete BIOS 207

Entomology Electives
complete Any Entomology Course at any Level

ACE 5 Humanities
complete 1 from ACE5

14 HR TERM 5
Biochem/Chemistry/Physics
complete CHEM 251

Entomology Core
complete ENTO 400

ACE 7 Arts
complete 1 from ACE7

Electives
recommend 1 or more courses

AGRI 388 is recommended in this term.

ACE 8 Ethical Principles
complete 1 from ACE8

17 HR TERM 6
Biochem/Chemistry/Physics
complete BIOC 321, BIOC 321L

Biological Sciences Elect
complete Any Biological Science Course

Entomology Core
complete ENTO 406

Electives
recommend 1 or more courses

AGRI 400 is recommended for this term.

Science Option Core
complete AGRI 115

ACE 9 Global/Human Divers
complete 1 from ACE9

16 HR TERM 7
Entomology Core
complete ENTO 401

Biochem/Chemistry/Physics
complete PHYS 151
Research Experience
complete ENTO 395A

Select a version of ENTO 395 for this term.

Entomology Electives
complete Any Entomology Course at any Level

Electives
recommend 1 or more courses

It is recommended to take a Professional Elective this term.

15 HR TERM 8

ACE 10 Capstone
complete ENTO 485

ENTO 485 becomes critical to your success in the major if not completed by the eighth term of enrollment.

Entomology Electives
complete Any Entomology Course at any Level

Teaching Experience
complete ENTO 395B

Select a second version of ENTO 395 for this term.

Electives
recommend 1 or more courses

It is recommended to take two Professional Electives this term.

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
- Ph. D. Graduate Assistant, University of Arkansas - Fayetteville AR
- Biological Science Aid, USDA - Lincoln NE
- RCOI Regional Coordinator at Ord Learning Center, Central Community College - Columbus NE
- Parent Characterization Scientist, Syngenta - Seward NE
- Queen Bee Rearing Specialist, Olivarez Honey Bees - Kona HI
- Insect Zoo Coordinator, Iowa State University - Ames IA
- Medical Officer, United States Navy - Jacksonville FL
- Assistant Manager, Earl May - Lincoln NE
- Sales Agronomist, Aurora Coop - Grand Island NE

Internships
- Entomology intern, Disney World - Epcott Center - Orlando FL
- Discovery group intern, Pioneer - York NE
- Extension intern, 4-H, FFA, Fillmore County Extension - Geneva NE
- IPM in hops, Perrault Farms - OR
- Plant breeding intern, Dow Chemical - York NE
- IPM scout in seed corn, Pioneer - York NE

Grad Schools
- Entomology, University of Arkansas - Fayetteville AR
- Plant Pathology/Entomology, Auburn University - Auburn AL
- Entomology, Washington State University - Pullman WA
- Masters of Science, University of Georgia - Athens GA
- Palmer College of Chiropractic - Davenport IA
- Masters of Entomology, University of Nebraska-Lincoln - Lincoln NE
- MS Entomology, University of Nebraska-Lincoln - Lincoln NE
- PhD, University of Nebraska-Lincoln - Lincoln NE
- Horticulture, University of Nebraska Lincoln - Lincoln NE
- Entomology Masters, University of Nebraska-Lincoln - Lincoln NE

Graduation Requirements
1. Performance Measure: 2.00 GPA required for graduation.
2. ***Total Credits Appyling Toward 120 Total Hours***