NATURAL RESOURCE & ENVIRONMENTAL ECONOMICS

Description
The natural resource and environmental economics degree program combines in-depth study of the natural sciences with economics, law, and other social sciences. The program provides students with training in the analysis of the benefits and costs of using natural resources and the environment for a variety of purposes including recreation, agriculture, wildlife habitat, industry, logging, and mining. In addition, the program emphasizes the assessment of public policies regulating the use of natural resources and environmental amenities. Students in this program work closely with faculty in both the agricultural economics department and the School of 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 sciences, and 2 units of world language. Students must also meet performance requirements: a 3.0 cumulative high school grade point average OR an ACT composite of 20 or higher, writing portion not required OR a score of 1040 or higher on the SAT Critical Reading and Math sections OR rank in the top one-half of graduating class; transfer students must have a 2.0 (on a 4.0 scale) cumulative grade point average and 2.0 on the most recent term of attendance. 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 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 the University of Nebraska–Lincoln, or within the first calendar year at Nebraska, whichever takes longer, excluding foreign languages. Students have up to 60 credit hours to remove world language deficiencies. College-level coursework taken to remove deficiencies may be used to meet degree requirements in CASNR.

Deficiencies in the required entrance subjects can be removed by the completion of specified courses in the University or by correspondence. The Office of Admissions, Alexander Building (south entrance), City Campus, provides information to new students on how deficiencies can be removed.

College Degree Requirements

Curriculum Requirements
The curriculum requirements of the College consist of three areas: ACE (Achievement-Centered Education), College of Agricultural Sciences and Natural Resources Core, and Degree Program requirements and electives. All three areas of the College Curriculum Requirements are incorporated within the description of the Major/Degree Program sections of the catalog. The individual major/degree program listings of classes ensures that a student will meet the minimum curriculum requirements of the College.

World Languages/Language Requirement
Two units of a world language are required. This requirement is usually met with two years of high school language.

Minimum Hours Required for Graduation
The College grants the bachelors degree in programs associated with agricultural sciences, natural resources, and related programs. Students working toward a degree must earn at least 120 semester hours of credit. A minimum cumulative grade point average of C (2.0 on a 4.0 scale) must be maintained throughout the course of studies and is required for graduation. Some degree programs have a higher cumulative grade point average required for graduation. Please check the degree program on its graduation cumulative grade point average.

Grade Rules

Removal of C-, D, and F Grades
Only the most recent letter grade received in a given course will be used in computing a student’s cumulative grade point average if the student has completed the course more than once and previously received a grade or grades below C in that course.

The previous grade (or grades) will not be used in the computation of the cumulative grade point average, but it will remain a part of the academic record and will appear on any transcript.

A student can remove from his/her cumulative average a course grade of C, D+, D, D-, or F if the student repeats the same course at the University of Nebraska and receives a grade other than P (pass), I (incomplete), N (no pass), W (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. Some degree programs have a higher cumulative grade point average required for graduation. Please check the degree program on its graduation cumulative grade point average.

Transfer Credit Rules
To be considered for admission, a transfer student, Nebraska resident or nonresident, must have an accumulated average of C (2.0 on a 4.0 scale) and a minimum C average in the last semester of attendance at another college. Transfer students who have completed less than 12 credit hours of college study must submit either ACT or SAT scores.

Ordinarily, credits earned at an accredited college are accepted by the University. The College, however, will evaluate all hours submitted on an application for transfer and reserves the right to accept or reject
any of them. Sixty (60) is the maximum number of hours the University will accept on transfer from a two-year college. Ninety (90) is the maximum number of hours the University will accept from a four-year college. Transfer credit in the degree program must be approved by the degree program advisor on a Request for Substitution Form to meet specific course requirements, group requirements, or course level requirements in the major. At least 9 hours in the major field, including the capstone course, must be completed at the University of Nebraska—Lincoln regardless of the number of hours transferred.

The College will accept no more than 10 semester hours of C, D+, D, and D- grades from other schools. The C, D+, D, and D- grades can only be applied to free electives. This policy does not apply to the transfer of grades from UNO or UNK to the University of Nebraska—Lincoln.

**Joint Academic Transfer Programs**

The College of Agricultural Sciences and Natural Resources has agreements with many institutions to support joint academic programs. The transfer programs include dual degree programs and cooperative degree programs. Dual degree programs offer students the opportunity to receive a degree from a participating institution and also to complete requirements for a bachelor of science degree in CASNR. Cooperative programs result in a single degree from either the University of Nebraska—Lincoln or the cooperating institution.

**Dual Degree Programs**

**A to B Programs**

The A to B Program, a joint academic program offered by the CASNR and participating community colleges, allows students to complete the first two years of a degree program at the participating community college and continue their education and study in a degree program leading toward a bachelor of science degree.

The A to B Program provides a basic knowledge plus specialized coursework. Students transfer into CASNR with junior standing.

Depending on the community college, students enrolled in the A to B Program may complete the requirements for an associate of science at the community college, transfer to the University of Nebraska—Lincoln, and work toward a bachelor of science degree.

Participating community colleges include:

- Central Community College
- Metropolitan Community College
- Mid-Plains Community College
- Nebraska College of Technical Agriculture
- Nebraska Indian Community College
- Northeast Community College
- Southeast Community College
- Western Nebraska Community College

**3+2 Programs**

Two specialized degree programs in animal science and veterinary science are offered jointly with an accredited college or school of veterinary medicine. These two programs permit CASNR animal science or veterinary science students to receive a bachelor of science degree from the University of Nebraska—Lincoln with a degree in animal science or veterinary science after successfully completing two years of the professional curriculum in veterinary medicine at an accredited veterinary school. Students who successfully complete the 3+2 Program, must provide transcripts and complete the Application for Degree form via MyRED. Students without MyRED access may apply for graduation in person at Husker Hub in the Canfield Administration Building, or by mail. Students should discuss these degree programs with their academic advisor.

**Cooperative Degree Programs**

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

**UNL Degree-Granting Programs**

A University of Nebraska—Lincoln degree-granting program is designed to provide students the opportunity to complete a two-year program of study at one of the four-year institutions listed below, transfer to CASNR, and complete the requirements for a bachelor of science degree.

- **Chadron State College.** Chadron State College offers a 2+2 program leading to a grassland ecology and management degree program and a transfer program leading to a bachelor of science in agricultural education in the teaching option.

- **Wayne State College.** Wayne State College offers a 3+1 program leading to a bachelor of science in plant biology in the ecology and management option and a 3+1 program leading to a bachelor of science in Applied Science.

- **University of Nebraska at Kearney.** Transfer programs are available for students pursuing degree programs leading to a bachelor of science degree.

- **University of Nebraska at Omaha.** Transfer programs are available for students pursuing degree programs leading to a bachelor of science degree.

**Non University of Nebraska—Lincoln Degree-Granting Programs**

CASNR cooperates with other institutions to provide coursework that is applied towards a degree at the cooperating institution. Pre-professional programs offered by CASNR allow students to complete the first two or three years of a degree program at the University prior to transferring and completing a degree at the cooperating institution.

- **Chadron State College—Range Science.** The 3+1 Program in range science allows Chadron State College students to pursue a range science degree through Chadron State College. Students complete three years of coursework at Chadron State College and one year of specialized range science coursework (32 credit hours) at CASNR.

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

**Residency**

Students must complete at least 30 of the total hours for their degree using University of Nebraska—Lincoln credits. At least 18 of the 30 credit hours must be in courses offered through CASNR (>299) including the appropriate ACE 10 degree requirement or an approved ACE 10 substitution offered through another Nebraska college and excluding independent study regardless of the number of hours transferred. Credit earned during education abroad may be used toward the residency requirement if students register through the University of
Nebraska–Lincoln and participate in prior-approved education abroad programs. University of Nebraska–Lincoln open enrollment and summer independent study courses count toward residence.  

Includes courses taught by CASNR faculty through interdisciplinary prefixes (e.g., LIFE, MBIQ, ENVR, SCIL, EAEP, HRTM, ENSC) and CASNR crosslisted courses taught by non-CASNR faculty.

**Online and Distance Education**  
There are many opportunities to earn college credit online through the University of Nebraska–Lincoln. Some of these credits may be applicable not only as elective credits but also toward the fulfillment of the College's education requirements. Credits earned online may count toward residency. However, certain offerings may not be counted toward scholarship requirements or academic recognition criteria.

For further information, contact:  
Office of Online and Distance Education  
University of Nebraska–Lincoln  
305 Brace Labs  
Lincoln, NE 68588-0109  
402-472-4681  
http://online.unl.edu/

**Independent Study Rules**  
Students wishing to take part in independent studies must obtain permission; complete and sign a contract form; and furnish copies of the contract to the instructor, advisor, departmental office, and the Dean’s Office. The contract should be completed before registration. Forms are available in 103 Agricultural Hall or online at the CASNR website.

Independent study projects include research, literature review or extension of coursework under supervision and evaluation of a departmental faculty member.

Students may only count 12 hours of independent study toward their degrees and no more than 6 hours can be counted during their last 36 hours earned, excluding senior thesis, internships, and courses taught under an independent study number.

**Other College Degree Requirements**  
**Capstone Course Requirement**  
A capstone course is required for each CASNR degree program. A capstone course is defined as a course in which students are required to integrate diverse bodies of knowledge to solve a problem or formulate a policy of societal importance.

**ACE Requirements**  
All students must fulfill the Achievement Centered Education (ACE) requirements. Information about the ACE program may be viewed at ace.unl.edu (https://ace.unl.edu/).

The minimum requirements of CASNR reflect the common core of courses that apply to students pursuing degrees in the college. Students should work with an advisor to satisfy ACE outcomes 1, 2, 3, 4, 6, and 10 with the college requirements.

**Catalog Rule**  
Students must fulfill the requirements stated in the catalog for the academic year in which they are first admitted to the University of Nebraska–Lincoln or when they were first admitted to a Joint Academic Transfer Program. 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 Nebraska in the College of Agricultural Sciences and Natural Resources. Students must complete all degree requirements from a single catalog year. The catalog which a student follows for degree requirements may not be more than 10 years old at the time of graduation.

**Learning Outcomes**  
Graduates of natural resources and environmental economics will be able to:

1. Understand and apply economic and business principles along with analytical methods to practical issues and problems in food, agriculture, business, community vitality, and natural resources.
2. Understand international forces that have an impact upon United States agriculture and the domestic economy.
3. Effectively communicate, to both specialized and lay audiences, such matters as agricultural business management decisions, business marketing plans, and economic and policy analysis through written, oral, and electronic means as individuals and as team participants.

**Major Requirements**  
**Core Requirements**  
**College Integrative Course (ACE 8)**  
| SCIL 101 | Science and Decision-Making for a Complex World | 3 |
| Credit Hours Subtotal: | 3 |

**Communications**  
**Written Communication (ACE 1)**  
Select one of the following:  
| 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 |
| JGEN 300 | Technical Communication II |
| Oral Communication (ACE 2) |  |
| Select one of the following: | 3 |
| ALEC 102 | Interpersonal Skills for Leadership |
| COMM 101 | Communication in the 21st Century |
| COMM 109 | Fundamentals of Human Communication |
| COMM 209 | Public Speaking |
| COMM 210 | Communicating in Small Groups |
| COMM 215 | Visual Communication |
| COMM 283 | Interpersonal Communication |
| COMM 286 | Business and Professional Communication |
| JGEN 300 | Technical Communication II |
| MRKT 257 | Sales Communication |
| NRES 301 | Environmental Communication Skills |
| TMFD 121 | Visual Communication and Presentation |
| Credit Hours Subtotal: | 6 |

**Mathematics and Statistics (ACE 3)**  
| STAT 218 | Introduction to Statistics | 3 |
| or ECON 215 | Statistics |
| Select one of the following: | 3-5 |
MATH 104  Applied Calculus
MATH 106  Calculus I
Credit Hours Subtotal: 6

Natural Sciences
Select 4 hours of CASNR approved Life Sciences (ACE 4) from the following:
AGRO 131 / HORT 131 and Agronomic Plant Science Laboratory & AGRO 132
AGRO 132
BIOS 101 General Biology & BIOS 101L and General Biology Laboratory
ENTO 115 / BIOS 115 and Insect Biology
BIOS 115 & ENT 116 / BIOS 116 and Insect Identification
HORT 131 / AGRO 131 and Horticultural Plant Science Laboratory & HORT 133
LIFE 120 & LIFE 120L and Fundamentals of Biology I
LIFE 121 & LIFE 121L and Fundamentals of Biology II
Select one of the following: 4-5
CHEM 105A & CHEM 105L Chemistry in Context I and Chemistry in Context I Laboratory
CHEM 109A & CHEM 109L General Chemistry I and General Chemistry I Laboratory
MSYM 109 Physical Principles in Agriculture and Life Sciences
PHYS 141 Elementary General Physics I
PHYS 151 Elements of Physics
PHYS 211 General Physics I
Credit Hours Subtotal: 8

Economics, Humanities, and Social Sciences (ACE 6)
ECON 211 Principles of Macroeconomics 3
AECN 141 Introduction to the Economics of Agriculture (ACE 6) 3
or ECON 212 Principles of Microeconomics
Select one course each from ACE outcomes 5, 7, and 9 9
Credit Hours Subtotal: 15
Total Credit Hours 38

Environmental Economics Option
Natural Resources
NRES 220 Principles of Ecology 3
NRES 323 Natural Resources Policy 3
Select one of the following: 3-4
NRES 218 Introduction to Geospatial Technologies
NRES 412 / GEOG 412 Introduction to Geographic Information Systems
NRES 418 / GEOG 418 Introduction to Remote Sensing
Select one of the following: 3-4
GEOL 100 Introduction to Geology
GEOL 101 Dynamic Earth

GEOL 106 Environmental Geology
METR 100 Weather and Climate
NRES 208 Climate Literacy in Natural Resources
SOIL 153 / AGRO 153 / HORT 153 Soil Resources
WATS 281 / GEOG 281 / NRES 281 Introduction to Water Science
Credit Hours Subtotal: 12

Resource and Economics Requirements
AECN 20 Seminar in Agricultural and Applied Economics 0
AECN 100 New Student Career Orientation 1
AECN 265 / NREE 265 Resource and Environmental Economics I 3
AECN 357 / NREE 357 Natural Resource and Environmental Law 3
AECN 445 / NREE 445 Agricultural and Natural Resource Policy 3
AECN 465 / NREE 465 / WATS 465 Resource and Environmental Economics II 3
ECON 311B Intermediate Macroeconomics - Descriptive 3
ECON 312B Intermediate Microeconomics - Descriptive 3
AECN 340 Quantitative Methods in Agribusiness or ECON 417 Introductory Econometrics 3
Select three of the following: 9
AECN 376 Rural Community Economics
AGRO 489 / CRPL 489 / HORT 489 Urbanization of Rural Landscapes
ECON 340 Introduction to Urban-Regional Economics
ECON 371 Elements of Public Finance
ECON 472 Efficiency in Government
MNGT 300 Management Essentials For Contemporary Organizations or MNGT 30 Introduction to Management or MNGT 360 Managing Behavior in Organizations or MNGT 36 Human Resource Management
NRES 423 Integrated Resources Management
SOCI 346 Environmental Sociology
Select 6 hours of AECN or ABUS electives 1 6
Credit Hours Subtotal: 37

Core Requirements
Complete requirements 49-52
Credit Hours Subtotal: 49

Free Electives
Select 20-25 hours 20-25
Credit Hours Subtotal: 22
Total Credit Hours 120

1 Select courses at the 200 level or above; excluding AECN 388.
### Energy Economics Option

**Natural Resources**

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<td>Agricultural and Natural Resource Policy Analysis (Capstone, ACE 10)</td>
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### Energy Analysis

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<td>ENSC 110</td>
<td>Energy in Perspective</td>
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<tr>
<td>ENSC 220</td>
<td>Introduction to Energy Systems</td>
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Credit Hours Subtotal: 9

### Core Requirements

**Complete requirements** 49-52

Credit Hours Subtotal: 49

### Free Electives

Select 17-22 hours 17-22

Credit Hours Subtotal: 19

Total Credit Hours 120

### Eco-Business and Sustainability Option

**Natural Resources**

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### Supporting Courses

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<tr>
<td>ACCT 202</td>
<td>Introductory Accounting II</td>
<td>3</td>
</tr>
<tr>
<td>AECN 425</td>
<td>Agricultural Marketing in a Multinational Environment</td>
<td>3</td>
</tr>
<tr>
<td>ECON 311B</td>
<td>Intermediate Macroeconomics - Descriptive</td>
<td>3</td>
</tr>
<tr>
<td>ECON 312B</td>
<td>Intermediate Microeconomics - Descriptive</td>
<td>3</td>
</tr>
<tr>
<td>FINA 300</td>
<td>Financial Decision Making</td>
<td>3</td>
</tr>
<tr>
<td>or FINA 361</td>
<td>Finance</td>
<td></td>
</tr>
<tr>
<td>MRKT 341 / ABUS 341</td>
<td>Marketing</td>
<td>3</td>
</tr>
<tr>
<td>MRKT 443</td>
<td>Consumer Behavior: Marketing Aspects</td>
<td>3</td>
</tr>
</tbody>
</table>
Select one of the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>AECN 340</td>
<td>Quantitative Methods in Agribusiness</td>
<td>3</td>
</tr>
<tr>
<td>ECON 417</td>
<td>Introductory Econometrics</td>
<td>3</td>
</tr>
<tr>
<td>SCMA 331</td>
<td>Operations and Supply Chain Management</td>
<td>3</td>
</tr>
</tbody>
</table>

Credit Hours Subtotal: **27**

### Core Requirements

Complete requirements: **49-52**

Credit Hours Subtotal: **49**

### Free Electives

Select 17-21 hours: **17-21**

Credit Hours Subtotal: **18**

Total Credit Hours: **120**

**Water Economics Option**

**Natural Resources**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>NRES 220</td>
<td>Principles of Ecology</td>
<td>3</td>
</tr>
<tr>
<td>NRES 323</td>
<td>Natural Resources Policy</td>
<td>3</td>
</tr>
</tbody>
</table>

Select one of the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>NRES 218</td>
<td>Introduction to Geospatial Technologies</td>
<td>3-4</td>
</tr>
<tr>
<td>NRES 412 / GEOG 412</td>
<td>Introduction to Geographic Information Systems</td>
<td>3-4</td>
</tr>
<tr>
<td>NRES 418 / GEOG 418</td>
<td>Introduction to Remote Sensing</td>
<td>3-4</td>
</tr>
</tbody>
</table>

Select one of the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEOL 100</td>
<td>Introduction to Geology</td>
<td>3</td>
</tr>
<tr>
<td>GEOL 101</td>
<td>Dynamic Earth</td>
<td>3</td>
</tr>
<tr>
<td>GEOL 106</td>
<td>Environmental Geology</td>
<td>3</td>
</tr>
<tr>
<td>METR 100</td>
<td>Weather and Climate</td>
<td>3</td>
</tr>
<tr>
<td>NRES 208</td>
<td>Climate Literacy in Natural Resources</td>
<td>3</td>
</tr>
<tr>
<td>SOIL 153 / AGRO 153 / HORT 153</td>
<td>Soil Resources</td>
<td>3</td>
</tr>
<tr>
<td>WATS 281 / GEOG 281 / NRES 281</td>
<td>Introduction to Water Science</td>
<td>3</td>
</tr>
</tbody>
</table>

Credit Hours Subtotal: **12**

**Water Science**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>NRES 453</td>
<td>Hydrology</td>
<td>3</td>
</tr>
</tbody>
</table>

Select two of the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>NRES 488 / GEOG 488</td>
<td>Groundwater Geology</td>
<td>3</td>
</tr>
<tr>
<td>WATS 361 / AGRO 361 / GEOL 361 / SOIL 361 / NRES 361</td>
<td>Soils, Environment and Water Quality</td>
<td>3</td>
</tr>
<tr>
<td>WATS 418 / GEOG 418 / NRES 419</td>
<td>Chemistry of Natural Waters</td>
<td>3</td>
</tr>
<tr>
<td>WATS 452 / AGRO 452 / MSYM 452</td>
<td>Irrigation Systems Management</td>
<td>3</td>
</tr>
</tbody>
</table>

WATS 459 / BIOS 459 / NRES 459 | Limnology | 3 |
WATS 468 / BIOS 458 / NRES 468 | Wetlands | 3 |

Credit Hours Subtotal: **9**

**Economics, Law and Policy**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>AECN 20</td>
<td>Seminar in Agricultural and Applied Economics</td>
<td>0</td>
</tr>
<tr>
<td>AECN 100</td>
<td>New Student Career Orientation</td>
<td>1</td>
</tr>
<tr>
<td>AECN 265 / NREE 265</td>
<td>Resource and Environmental Economics I</td>
<td>3</td>
</tr>
<tr>
<td>AECN 257 / NREE 357</td>
<td>Natural Resource and Environmental Law</td>
<td>3</td>
</tr>
<tr>
<td>AECN 445 / NREE 445</td>
<td>Agricultural and Natural Resource Policy Analysis (Capstone, ACE 10)</td>
<td>3</td>
</tr>
<tr>
<td>AECN 465 / NREE 465 / WATS 465</td>
<td>Resource and Environmental Economics II</td>
<td>3</td>
</tr>
</tbody>
</table>

Select two major electives of the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>AECN 376</td>
<td>Rural Community Economics</td>
<td>3</td>
</tr>
<tr>
<td>AGRO 489 / CRPL 489 / HORT 489</td>
<td>Urbanization of Rural Landscapes</td>
<td>3</td>
</tr>
<tr>
<td>ECON 340</td>
<td>Introduction to Urban-Regional Economics</td>
<td>3</td>
</tr>
<tr>
<td>ECON 371</td>
<td>Elements of Public Finance</td>
<td>3</td>
</tr>
<tr>
<td>ECON 472</td>
<td>Efficiency in Government</td>
<td>3</td>
</tr>
<tr>
<td>MNGT 300</td>
<td>Management Essentials For Contemporary Organizations</td>
<td>3</td>
</tr>
<tr>
<td>or MNGT 360</td>
<td>Managing Behavior in Organizations</td>
<td>3</td>
</tr>
<tr>
<td>or MNGT 361</td>
<td>Human Resource Management</td>
<td>3</td>
</tr>
<tr>
<td>NRES 423</td>
<td>Integrated Resources Management</td>
<td>3</td>
</tr>
<tr>
<td>SOCI 346</td>
<td>Environmental Sociology</td>
<td>3</td>
</tr>
</tbody>
</table>

Credit Hours Subtotal: **31**

### Core Requirements

Complete requirements: **49-52**

Credit Hours Subtotal: **49**

### Free Electives

Select 14-22 hours: **14-22**

Credit Hours Subtotal: **19**

Total Credit Hours: **120**

---

1. Select a course at the 200 level or above; excluding AECN 388.
Additional Major Requirements

Grade Rules
Pass/No Pass
Natural resource and environmental economics students must complete at least 15 credit hours of agricultural economics courses for a grade (not Pass/No Pass).

International Requirements
Nine (9) hours of coursework with an international focus are required as part of the 120 hours required for a degree. Course options include those listed below, those listed in the University’s Global Studies degree program or any ACE 9 course.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>AECN 220</td>
<td>International Agricultural Trade</td>
<td>3</td>
</tr>
<tr>
<td>AECN 346</td>
<td>World Food Economics</td>
<td>3</td>
</tr>
<tr>
<td>AECN 367</td>
<td>Agricultural Development in Developing Countries</td>
<td>3</td>
</tr>
<tr>
<td>AECN 420</td>
<td>International Food and Agricultural Trade</td>
<td>3</td>
</tr>
<tr>
<td>AECN 425</td>
<td>Agricultural Marketing in a Multinational Environment</td>
<td>3</td>
</tr>
<tr>
<td>AGRI 282</td>
<td>Introduction to Global Agricultural and Natural Resources Issues</td>
<td>3</td>
</tr>
<tr>
<td>AGRI 310</td>
<td>Study Tours in International Agriculture</td>
<td>1-5</td>
</tr>
<tr>
<td>NRES 492</td>
<td>International Study Tours in Natural Resource Management</td>
<td>1-3</td>
</tr>
</tbody>
</table>

ACE Requirements
ACE courses cannot be used to count in two separate requirement areas except in the case of International Requirements (see above).

Requirements for Minor Offered by Department

Natural Resource Economics Minor
This minor is intended primarily for students interested in natural resource management who are studying in technical areas such as water science, range science, soils, engineering, or fisheries and wildlife. The intent is to offer technically-oriented students an opportunity to develop complementary economics and policy analysis skills.

Core Requirements

**Economics**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>AECN 265 / NREE 265</td>
<td>Resource and Environmental Economics I</td>
<td>3</td>
</tr>
<tr>
<td>AECN 465 / NREE 465 / WATS 465</td>
<td>Resource and Environmental Economics II</td>
<td>3</td>
</tr>
</tbody>
</table>

Credit Hours Subtotal: 6

Additional Courses
Select four of the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>AECN 357 / NREE 357</td>
<td>Natural Resource and Environmental Law</td>
</tr>
<tr>
<td>AECN 445 / NREE 445</td>
<td>Agricultural and Natural Resource Policy Analysis</td>
</tr>
<tr>
<td>ECON 340</td>
<td>Introduction to Urban-Regional Economics</td>
</tr>
<tr>
<td>ECON 371</td>
<td>Elements of Public Finance</td>
</tr>
<tr>
<td>ECON 472</td>
<td>Efficiency in Government</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MNGT 360</td>
<td>Managing Behavior in Organizations</td>
<td></td>
</tr>
<tr>
<td>NRES 323</td>
<td>Natural Resources Policy</td>
<td></td>
</tr>
<tr>
<td>NRES 423</td>
<td>Integrated Resources Management</td>
<td></td>
</tr>
<tr>
<td>POLS 236</td>
<td>Public Policy Analysis: Methods and Models</td>
<td></td>
</tr>
<tr>
<td>SOCI 346</td>
<td>Environmental Sociology</td>
<td></td>
</tr>
</tbody>
</table>

Credit Hours Subtotal: 12

Total Credit Hours 18

NREE 265 Resource and Environmental Economics I
Crosslisted with: AECN 265
Prerequisites: ECON 212 or AECN 141.
Description: Introduction to environmental and natural resource economics and the role of such concepts in natural resource management. Application of economic principles to actual natural resource/environmental issues with focus on tradeoffs, cost and benefits, and decision making.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option
Offered: SPRING

NREE 357 Natural Resource and Environmental Law
Crosslisted with: AECN 357
Prerequisites: Junior standing
Notes: SCIL 101 or GEOG 181 recommended.
Description: Environmental impact review; air and water pollution control; solid and hazardous waste control; endangered species and habitat preservation; land use regulation; state and federal water rights law.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option

NREE 445 Agricultural and Natural Resource Policy Analysis
Crosslisted with: AECN 445
Prerequisites: ECON 311 and ECON 312
Notes: Capstone course. Familiarity with spreadsheets (Excel) required.
Description: Introduction to the application of economic concepts and tools to the analysis and evaluation of public policies. Economic approaches to policy evaluation derived from welfare economics. Social benefit-cost analysis described and illustrated through applications to current agricultural and natural resource policy issues.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option

ACE: ACE 8 Civic/Ethics/Stewardship ACE 10 Integrated Product
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Crosslisted with</th>
<th>Prerequisites</th>
<th>Notes</th>
<th>Description</th>
<th>Credit Hours</th>
<th>Max credits per semester</th>
<th>Max credits per degree</th>
<th>Grading Option</th>
<th>Offered</th>
<th>ACE:</th>
</tr>
</thead>
<tbody>
<tr>
<td>NREE 456</td>
<td>Environmental Law</td>
<td>AECN 456, AECN 856</td>
<td>Senior standing.</td>
<td>Available through Online and Distance Education.</td>
<td>Principles of law involved in environmental issues, externalities and market failures, public health, environmental litigation, and legislation. Environmental issues are related to statutory, administrative, and regulatory authorities.</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>Graded with Option</td>
<td>FAL</td>
<td>ACE 5 Environmental Science</td>
</tr>
<tr>
<td>NREE 457</td>
<td>Water Law</td>
<td>AECN 457, AECN 857, WATS 457</td>
<td>AECN/NREE 357.</td>
<td></td>
<td>Environmental impact review; public trust doctrine; endangered species; land use controls; wetlands regulation; surface and ground water rights; Indian and federal water rights; impact of water quality regulations on water allocation.</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>Graded with Option</td>
<td>FAL/SPR</td>
<td>ACE 5 Environmental Science</td>
</tr>
<tr>
<td>NREE 465</td>
<td>Resource and Environmental Economics II</td>
<td>AECN 465, AECN 865, WATS 465</td>
<td>MATH 104 and one course in statistics.</td>
<td></td>
<td>Application of resource economics concepts and empirical tools to resource management problems. Public policy issues involving environmental quality, land and water management.</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>Graded with Option</td>
<td>FAL/SPR</td>
<td>ACE 5 Environmental Science</td>
</tr>
<tr>
<td>NRES 101</td>
<td>Natural Resources Orientation</td>
<td></td>
<td>Permission</td>
<td></td>
<td>Introduction to natural resource disciplines. Fisheries, wildlife, forestry, grasslands, climate, and water science. Participate in field exercises in terrestrial and aquatic ecosystems.</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>Graded</td>
<td>FALL</td>
<td>ACE 9 Global/Diversity</td>
</tr>
<tr>
<td>NRES 103</td>
<td>Introduction to Agricultural and Natural Resource Systems</td>
<td>AGRI 103</td>
<td>AECN/NREE 357.</td>
<td></td>
<td>Agricultural and natural resource systems. The interrelationship and the impact of increased human involvement on these systems.</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>Graded with Option</td>
<td>FAL/SPR</td>
<td>ACE 5 Environmental Science</td>
</tr>
<tr>
<td>NRES 104</td>
<td>Climate in Crisis</td>
<td></td>
<td></td>
<td></td>
<td>Past, present and future climate change. Climate science basics in the context of global changes (such as global warming, droughts, deforestation) that impact Earth and its inhabitants. Future climate change scenarios and possible impacts.</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>Graded</td>
<td>FAL/SPR</td>
<td>ACE 5 Environmental Science</td>
</tr>
<tr>
<td>NRES 107</td>
<td>Invasive Plant Species: Impacts on Ecosystems</td>
<td>AGRO 107</td>
<td></td>
<td>Online only</td>
<td>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 their impacts on ecosystems from local to global scales.</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>Graded</td>
<td>FAL/SPR</td>
<td>ACE 9 Global/Diversity</td>
</tr>
<tr>
<td>NRES 108</td>
<td>Earth's Natural Resource Systems Laboratory</td>
<td></td>
<td></td>
<td></td>
<td>Introduction to Earth's natural resource systems. Interactions between the geosphere (solid earth) and the hydrosphere. The atmosphere and biosphere over many different spatial and temporal scales, and role of humans as part of the system.</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>Graded</td>
<td>FAL/SPR</td>
<td>ACE 4 Science</td>
</tr>
</tbody>
</table>
NRES 109 Water in Society
Crosslisted with: SCIL 109, AECH 109, ENV 109, GEOG 109
Description: Introduction to the scientific, social, and economic dimensions of historical and contemporary water systems. Students will develop an understanding of hydrologic systems and analyze and engage in decision-making about complex challenges associated with water resource use.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option
Offered: FALL
Prerequisite for: SCIL 300
ACE: ACE 4 Science ACE 8 Civic/Ethics/Stewardship

NRES 111 Natural Resource Conservation in Society
Description: Explore and distinguish the values, civics, and stewardship of natural resource conservation in agricultural and natural ecosystems. Examine the philosophies of ecosystem services and stewardship within a dynamic human-dominated world. Students will discuss and critically analyze current issues related to conservation of natural resources.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option
Prerequisite for: SCIL 300

NRES 115 Introduction to Environmental Science
Notes: High school earth sciences, chemistry and mathematics courses recommended.
Description: Emphasizes understanding the natural world and improving science literacy by learning the scientific method. Contemporary environmental problems are presented along with relevant questions. The scientific method along with fundamental concepts of chemistry, physics and biology are used to present possible solutions to environmental issues.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Grading Option: Graded
Offered: FALL
ACE: ACE 4 Science

NRES 125 Introduction to Zoo and Aquarium Science
Description: Become familiar with the concepts and challenges associated with biological, ethical, welfare, and administrative aspects of zoo science and captive animal care. Conduct an ethology study using the scientific method.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded
ACE: ACE 4 Science

NRES 130 People of Great Plains
Description: The Great Plains region offers considerable ecological and cultural diversity, encompassing more than 600 million acres which have been occupied by humans for over 12,000 years. Introduction to the different populations who have called the Great Plains home, and how they have made a living on this landscape. Investigate Native American life ways in the Great Plains from the time of initial colonization up to European contact and the dramatic changes experienced during the historic era. Select topics centered on contemporary socio-ecological systems on the Plains and how understanding of past Plains experiences can be used to inform on these contemporary issues.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option
ACE: ACE 5 Humanities

NRES 163 Oh My Cod: Exploring Aquatic Ecology Careers
Prerequisites: Limited to Freshman or Sophomore classification only
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 1
Grading Option: Graded with Option

NRES 170 Introduction to Great Plains Studies
Crosslisted with: ANTH 170, GEOG 170, GPSP 170, SOCI 170
Description: Interdisciplinary study of the natural environment, social environment, human heritage, arts and humanities of the Great Plains.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option
Prerequisites: Limited to Freshman or Sophomore classification only

NRES 201 Dendrology: Study and Identification of Trees and Shrubs
Crosslisted with: HORT 201, LARC 201
Description: An introduction to the naming, identification, and natural history of woody trees and shrubs in North American with emphasis on trees common to Nebraska. Covers morphology, natural site conditions, wildlife and human uses of woody trees and shrubs.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option
Offered: FALL

NRES 208 Climate Literacy in Natural Resources
Description: Develop an understanding of the science of the climate system and the climate’s influence on our environment. Learn about climate interactions, impacts of changing climate conditions, and actions to reduce these impacts, particularly on natural resources. Develop competency in assessing scientific information about the global climate and learn that such information is essential in making informed decisions about natural resource management.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option
Offered: FALL
NRES 210 Applied Ornithology
Description: To explore interactions between birds and people from economic and scientific perspectives, understand societal conflicts between feral cats and birds, hazards birds present to aircraft, the economics of bird feeding, how commercial bird hunting clubs work, how populations are affected by collisions with vehicles, windows and towers, the taxidermy industry and museum science, and hunting organizations such as Pheasants Forever and Ducks Unlimited.
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 1
Grading Option: Graded
Offered: SPRING

NRES 211 Introduction to Conservation Biology
Prerequisites: Sophomore standing.
Description: Introduction to problems faced in fulfilling the ever increasing human needs while maintaining ecosystem and biodiversity. The integration of biological fields such as wildlife biology, ecology, evolution, and genetics with non-biological fields such as economics, philosophy, and politics to the dilemma this presents.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option

NRES 212 Woody Plants for Landscapes: Identification, Management, and Use
Crosslisted with: HORT 212, LARC 212
Description: Identification, basic management and design uses of trees and shrubs for sustainable landscapes, with an emphasis on native plants and plants adapted to the Plains states. Emphasis is on live specimens in outdoor environments, supported by online resources.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option
Offered: FALL

NRES 213 Cultivars and Varieties of Woody Plants for Landscapes
Crosslisted with: HORT 213, LARC 213
Description: Characteristics of commercially available trees and shrubs used in urban landscapes. Compares differences among cultivars, design uses, and management issues using a combination of live specimens in outdoor environments and online resources.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option
Offered: SPRING

NRES 214 Herbaceous Landscape Plants
Crosslisted with: HORT 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
Grading Option: Graded with Option

NRES 218 Introduction to Geospatial Technologies
Notes: Recommended to have basic computer skills
Description: Theory and applications of geospatial information technology (GIT) with emphasis on real-world applications to natural resources. Overview of GIT, focusing on introduction of remote sensing, the global positioning system (GPS), and geographic information systems (GIS). Introduction to data collection, spatial data representation, georeferencing, spatial data analysis, and remote sensing image analysis.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option
Offered: FALL/SPR

NRES 220 Principles of Ecology
Prerequisites: LIFE 121 or BIOS 101 or HORT 131; 3 hours MATH.
Notes: Not open to students who have completed BIOS 207. Will not count toward a major in BIOS. MATH 100A is not sufficient preparation.
Description: Ecology as a quantitative discipline that integrates the life and earth sciences to understand the dynamics of natural and managed ecosystems.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option
Prerequisite for: BIOS 459, BIOS 859, NRES 459, NRES 859, WATS 459; LARC 487, NRES 487; NRES 222; NRES 311; NRES 862, NRES 462

NRES 222 Ecology Laboratory
Prerequisites: NRES 220 or parallel.
Notes: May also be offered at Cedar Point Biological Station. Field trips to local ecosystems are required.
Description: Field and laboratory experiments in terrestrial and aquatic ecology.
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 1
Grading Option: Graded with Option
Prerequisite for: BIOS 459, BIOS 859, NRES 459, NRES 859, WATS 459; LARC 487, NRES 487; NRES 222; NRES 311; NRES 862, NRES 462

NRES 233 Wildlife Field Techniques
Prerequisites: Sophomore status.
Notes: Offered off-campus during academic breaks at Cedar Point Biological Station. Course fee applies.
Description: Field and laboratory skills needed for wildlife management emphasizing wildlife and vegetation surveys, mark-recapture of wildlife, radio-telemetry, aging and forensic methods, and habitat assessment.
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 1
Grading Option: Graded
NRES 235 Independent Fisheries and Wildlife Field Techniques  
Prerequisites: Permission  
Notes: Credit hours calculated (similar to NRES 233 and NRES 463L) as a laboratory with 2-3 contact hours per credit hours because of field work and independent study.  
Description: Introduction to field and laboratory skills used for fisheries and wildlife management emphasizing animal and habitat surveys, capture methods, radio-telemetry, sexing and aging methods, and habitat assessment using independent experiential learning.  
Credit Hours: 1  
Max credits per semester: 1  
Max credits per degree: 1  
Grading Option: Graded  
Offered: FALL

NRES 245 Introduction to Grassland Ecology and Management  
Crosslisted with: AGRO 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  
Grading Option: Graded with Option  
Prerequisite for: AGRO 340, RNGE 340, GRAS 340

NRES 249 Individual and Cultural Perspectives on the Environment  
Crosslisted with: ENVR 249  
Description: The influence of culture on individual perspectives related to the concepts of sustainability and the relationship that humans have with the environment. The role of ethics, religion, and historical setting on the individual and cultural perspectives related to environmental challenges at the local to global scales.  
Credit Hours: 3  
Max credits per semester: 3  
Max credits per degree: 3  
Grading Option: Graded with Option  
ACE: ACE 9 Global/Diversity

NRES 270 Biological Invaders  
Crosslisted with: AGRO 270, HORT 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  
Grading Option: Graded with Option

NRES 279 Soil Evaluation  
Crosslisted with: AGRO 279, SOIL 279  
Notes: AGRO/HORT/SOIL 153 - Soil Resources recommended, but not required. This course includes an inter-collegiate Soil Judging contest that takes place in the North Central region of the United States during the course of the class, or a course-based undergraduate research experience.  
Description: Apply fundamental knowledge to the description of soils in the field. Application of techniques employed in writing descriptions of soil morphology and in classifying and interpreting soils.  
Credit Hours: 2  
Max credits per semester: 2  
Max credits per degree: 2  
Grading Option: Graded with Option  
Offered: FALL  
Prerequisite for: NRES 379, AGRO 379, SOIL 379

NRES 281 Introduction to Water Science  
Crosslisted with: GEOG 281, WATS 281  
Prerequisites: High school chemistry or one semester college chemistry; one course in geology or physical geography or soil.  
Description: Survey of the water science from the perspective of both natural and social sciences. Water budget, precipitation, evapotranspiration, runoff and stream flow, groundwater, water quality parameters, economics of water, water policy, water law and water politics.  
Credit Hours: 3  
Max credits per semester: 3  
Max credits per degree: 3  
Grading Option: Graded with Option  
Prerequisite for: AGRO 361, GEOL 361, NRES 361, SOIL 361, WATS 361; NRES 319

NRES 289 People and the Land: Human Environmental Interactions on the Great Plains  
Crosslisted with: GEOG 289  
Description: Explore human environmental interaction on the Great Plains. Samples a variety of Great Plains cultures and time periods to explore past use of the Great Plains environment. Evaluation of attributes and related data critical to the operation of past social-ecological systems with reference to changing climatic/ecological dynamics, human environmental impacts, and the sustainability of various indigenous and western modes of land use on the Great Plains. Investigate knowledge of these processes and how they can be of relevance to contemporary issues of Great Plains land management and resource utilization.  
Credit Hours: 3  
Max credits per semester: 3  
Max credits per degree: 3  
Grading Option: Graded with Option  
ACE: ACE 6 Social Science ACE 5 Humanities

NRES 299 Special Topics  
Prerequisites: Permission.  
Description: Special topics in natural resources.  
Credit Hours: 1-4  
Min credits per semester: 1  
Max credits per semester: 4  
Max credits per degree: 4  
Grading Option: Graded with Option
NRES 300 Toxins in the Environment  
Crosslisted with: BIOS 300, ENTO 300  
Prerequisites: 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  
Grading Option: Graded with Option

NRES 301 Environmental Communication Skills  
Prerequisites: ACE 1 course. Sophomore or higher.  
Description: Written and oral communication skills for natural resource management including writing for the media, grant writing, conflict resolution and advocacy.  
Credit Hours: 3  
Max credits per semester: 3  
Max credits per degree: 3  
Grading Option: Graded  
Offered: FALL  
ACE: ACE 2 Communication Competence

NRES 302 Tree Biology  
Crosslisted with: HORT 302  
Prerequisites: BIOS 101 or LIFE 120 or HORT 131  
Description: The study of the structure and function of woody plants, with a focus on trees growing in temperate climates. Covers the basics of wood physiology in terms of the biological, physical, and chemical processes utilized by tree to function. The anatomy and morphology of trees with a focus on the impacts of tree maintenance to the structure and function of landscape trees.  
Credit Hours: 3  
Max credits per semester: 3  
Max credits per degree: 3  
Grading Option: Graded with Option  
Offered: FALL

NRES 308 Biogeography  
Crosslisted with: GEOG 308, GEOL 308  
Prerequisites: GEOG 155 or BIOS 101 and 101L or GEOL 101.  
Notes: Biogeography is a highly interdisciplinary science, relying heavily on ecology, geological science, and climatology. It is global in scope and offers the latest knowledge in understanding organism distributions, and the factors that determine those distributions.  
Description: Introduction to the basic concepts of biogeography, the study of distributions of plants and animals, both past and present.  
Credit Hours: 3  
Max credits per semester: 3  
Max credits per degree: 3  
Grading Option: Graded with Option

NRES 310 Introduction to Forest Management  
Prerequisites: BIOS 101, AGRO/HORT 131 or LIFE 120  
Description: Discussion of the history, biology, and management of the world’s forest resources with emphasis on the Great Plains region. Topics include: forest types and their relationship to site conditions, ecological principles of forest management, basic forest management practices, economic and policy decisions in forest management. The field-oriented lab emphasizes tree identification, forest ecology, forest management and wood products.  
Credit Hours: 4  
Max credits per semester: 4  
Max credits per degree: 4  
Grading Option: Graded with Option  
Offered: FALL

NRES 311 Wildlife Ecology and Management  
Prerequisites: NRES 220 or BIOS 207, or concurrent with NRES 220 or BIOS 207.  
Description: Applied ecology, conservation biology, population biology, and enhancement of vertebrate, non-domestic animal populations through management. Emphasis on policy, decision-making, and management options involving people, habitat, and wildlife.  
Credit Hours: 3  
Max credits per semester: 3  
Max credits per degree: 3  
Grading Option: Graded with Option  
Offered: SPRING  
ACE: ACE 2 Communication Competence

NRES 315 Human Dimensions of Fish and Wildlife Management  
Description: Introduction to the basic concepts and ideas relevant in the human dimension of fisheries and wildlife management. Covers social, cultural and economic values, attitudes and behavior of individuals and groups of various stakeholders in fisheries and wildlife management.  
Credit Hours: 3  
Max credits per semester: 3  
Max credits per degree: 3  
Grading Option: Graded with Option

NRES 316 Case Studies in Theoretical Ecology  
Crosslisted with: BIOS 316, MATH 316  
Prerequisites: MATH 106 or higher OR LIFE 121. Parallel registration in BIOS 316L.  
Description: Introduction to biological literature, applied mathematics, computer programming, and/or statistical techniques relevant to field questions in ecology, evolution, and behavior. Typical mathematical topics include discrete dynamics, systems of differential equations, matrix algebra, or statistical inference and probability.  
Credit Hours: 3  
Max credits per semester: 3  
Max credits per degree: 3  
Grading Option: Graded with Option  
Offered: SUMMER  
ACE: ACE 4 Science
NRES 319 Fundamentals of Environmental Sampling
Prerequisites: SOIL 153, WATS 281, CHEM 105 or CHEM 105A and 105L or CHEM 109 or CHEM 109A and 109L. Recommend taking STAT 218.
Description: Development of sampling plans and quality assurance project plans (QAPP). Stepwise procedures for correct sampling of soil-air-water environments. Data quality assessment.
Credit Hours: 2
Max credits per semester: 2
Max credits per degree: 2
Grading Option: Graded with Option
Prerequisite for: NRES 320

NRES 320 Fundamentals of Environmental Sampling Laboratory
Prerequisites: NRES 319 or concurrent enrollment
Notes: Outdoor and analytical laboratory field trips required.
Description: Demonstrations and hands-on participation in sampling of soil-air-water environments.
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 1
Grading Option: Graded with Option

NRES 321 Arboriculture: Maintenance & Selection of Landscape Trees
Crosslisted with: HORT 321
Prerequisites: Junior standing
Description: Covers practical application of the science of tree growth, development, and management in human-dominated landscapes. Tree selection for varying landscapes and objectives, proper planting and pruning, identification and correction of tree defects, and working with tree pest issues.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Grading Option: Graded with Option
Offered: SPRING
Groups: Laboratory and Field Training

NRES 322 Environmental Education Curricula
Description: National curricula are available to formal and non-formal environmental and STEM (science, technology, engineering, and math) educators. Become certified in a series of national environmental education curricula such as Project WILD, Project WET, Project Aquatic WILD and Project Learning Tree. Apply skills and curricula by teaching others through experiential service learning.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded
Offered: FALL/SPR

NRES 323 Natural Resources Policy
Prerequisites: Junior standing.
Description: Conflicts and common ground perpetuated by increasing demands on our natural resources. Policy development and issue analysis stressed. Historical policy actions reviewed and evaluated.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option

NRES 330 Environmental Health
Crosslisted with: NUTR 330
Prerequisites: Class standing of sophomore or above with at least one semester of chemistry and biology.
Description: Provides a comprehensive understanding of how environmental exposures to physical, chemical and biological hazards influence human health. Offers basic knowledge in the core concepts of toxicology, exposure and risk, vulnerable populations and the interrelationship between human, animal and environmental health.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option
Offered: FALL/SPR
ACE: ACE 8 Civic/Ethics/Stewardship

NRES 348 Wildlife Damage Management
Description: Fundamentals of prevention and control of damage caused by vertebrate pests, principally birds and mammals. Philosophical, ecological, and behavioral basis for controlling population levels or individuals of pest species.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option

NRES 361 Soils, Environment and Water Quality
Crosslisted with: AGRO 361, GEOL 361, SOIL 361, WATS 361
Prerequisites: AGRO/HORT/SOIL 153; MATH 102 or 103; two semesters chemistry (CHEM 105 or CHEM 105A and 105L, CHEM 106 or CHEM 106A and 106L, CHEM 109 or CHEM 109A and 109L, CHEM 110 or CHEM 110A and 110L) 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
Grading Option: Graded with Option

NRES 370 Applied Climatology
Crosslisted with: METR 370
Prerequisites: Junior or Senior Standing
Description: Processes that give rise to spatial and temporal differences in climate. Various interrelationships between humans and climate. Influence of climate on building styles, the economy, water resources, human health, and society. Humans’ inadvertent and purposeful modification of the atmosphere.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option
Offered: FALL
NRES 379 Advanced Soil Evaluation  
Crosslisted with: AGRO 379, SOIL 379  
Prerequisites: AGRO/NRES/SOIL 279  
Notes: This course includes a national- or regional-level inter-collegiate Soil Judging contest that takes place during the course of the class.  
Description: Apply fundamental knowledge and improve field techniques to the description and interpretation of soils in the field. Application of techniques employed in writing descriptions of soil morphology and in classifying and interpreting soils.  
Credit Hours: 1  
Max credits per semester: 1  
Max credits per degree: 3  
Grading Option: Graded with Option  
Offered: FALL/SPR

NRES 380 Geography of Africa  
Crosslisted with: GEOG 380, ETHN 380  
Description: Overview of the major physical and human landscapes in Africa. Prominent past and current events will be placed into a spatial context in an attempt to develop insight into the interrelationships that exist among people, cultures, countries, economies, and the environment, not only within Africa, but between Africa and the rest of the world.  
Credit Hours: 3  
Max credits per semester: 3  
Max credits per degree: 3  
Grading Option: Graded with Option  
ACE: ACE 9 Global/Diversity

NRES 386 Vertebrate Zoology  
Crosslisted with: BIOS 386  
Prerequisites: LIFE 121 & LIFE 121L  
Description: Evolutionary origin and relationships, natural history, and ecological adaptations of vertebrates. Comparative form and function, particularly of bone and muscle systems among and the diversity within vertebrate groups.  
Credit Hours: 4  
Max credits per semester: 4  
Max credits per degree: 4  
Grading Option: Graded with Option

NRES 388 Employment Seminar  
Crosslisted with: AGRI 388  
Prerequisites: Sophomore standing.  
Description: Efficient job-hunting. Resumes, cover letters, mock interviews, and dining etiquette.  
Credit Hours: 1  
Max credits per semester: 1  
Max credits per degree: 1  
Grading Option: Pass No Pass  
Prerequisite for: AGRI 395

NRES 393 Digital Imaging and Storytelling in Agriculture and Natural Resources  
Crosslisted with: ALEC 393  
Prerequisites: Consent of instructor(s). One college level course in photography or equivalent, and knowledge of the basics of shooting still photographs or video using digital cameras. Open only to College of Agricultural Sciences and Natural Resources students.  
Notes: Can be repeated for a maximum of 9 credit hours by consent of instructor.  
Description: Concepts and techniques related to use of remote and automated digital camera technology to capture images in agriculture and natural resources contexts to communicate a narrative/story. Completion of individual project using a variety of technologies including camera traps, time-lapse camera systems, remote triggered cameras, as well as traditional audio and video and conventional photography.  
Credit Hours: 1-9  
Min credits per semester: 1  
Max credits per semester: 9  
Max credits per degree: 9  
Grading Option: Graded

NRES 399 Independent Research  
Prerequisites: 8 hrs NRES or closely related areas.  
Notes: To be supervised and evaluated by a NRES faculty member.  
Description: 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: 6  
Grading Option: Graded

NRES 402 Aquatic Insects  
Crosslisted with: BIOS 485, BIOS 885, ENTO 402, ENTO 802, 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  
Grading Option: Graded with Option  
Prerequisite for: BIOS 485L, BIOS 885L, ENTO 402L, ENTO 802L, NRES 402L, NRES 802L

NRES 402L Identification of Aquatic Insects  
Crosslisted with: BIOS 485L, BIOS 885L, ENTO 402L, ENTO 802L, 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  
Grading Option: Graded with Option

NRES 404 Forestry, Fisheries and Wildlife Seminar  
Prerequisites: Junior standing or above in natural resources.  
Description: Seminar involving technical aspects of forestry, fisheries, and wildlife management.  
Credit Hours: 1  
Max credits per semester: 1  
Max credits per degree: 2  
Grading Option: Graded with Option
NRES 406 Plant Ecophysiology: Theory and Practice
Crosslisted with: AGRO 406, HORT 406, 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
Grading Option: Graded with Option

NRES 408 Microclimate: The Biological Environment
Crosslisted with: AGRO 408, GEOG 408, HORT 408, METR 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.
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
Grading Option: Graded with Option
Prerequisite for: AGRO 907, HORT 907, METR 907, NRES 907; BSEN 954, NRES 954

NRES 409 Human Dimensions of Natural Resources
Crosslisted with: GEOG 409
Prerequisites: Junior standing; 12 credit hours in natural resources, environmental studies, or closely related fields
Description: Overview of the human dimensions of natural resources issues. Exploration of the socioeconomic, cultural, and political aspects of human behavior and how these interact with, might influence, or are influenced by the environment.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option

NRES 410 Introduction to Geographic Information Systems
Crosslisted with: GEOG 412, GEOG 812, NRES 812
Description: Introduction to conceptual foundations and applications of computer-based geographic information systems (GIS). GIS database development, spatial data analysis, spatial modeling, GIS implementation and administration.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Grading Option: Graded with Option
Prerequisite for: GEOG 422, GEOG 822, GEOG 922, NRES 922

NRES 412 Introduction to Geographic Information Systems
Crosslisted with: GEOG 412, GEOG 812, NRES 812
Description: Introduction to conceptual foundations and applications of computer-based geographic information systems (GIS). GIS database development, spatial data analysis, spatial modeling, GIS implementation and administration.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Grading Option: Graded with Option
Prerequisite for: GEOG 422, GEOG 822, GEOG 922, NRES 922

NRES 413 Environmental Leadership
Crosslisted with: ALEC 410, ALEC 810, NRES 813
Prerequisites: Junior standing.
Notes: Offered on the World Wide Web (WWW) fall semester of odd-numbered years and in the classroom fall semester of even numbered-years.
Description: Major leaders in conservation and ecology that emphasizes agricultural and cultural issues and relationships with the environment.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option

NRES 415 GIS for Agriculture and Natural Resources
Crosslisted with: NRES 815
Prerequisites: NRES 312
Description: Principles of digitizing earth observations. Manipulate spatial data, create maps, and conduct spatial analyses. Use GIS to analyze and solve real-world questions in agriculture and natural resources.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Grading Option: Graded
Offered: FALL

NRES 417 Agroforestry Systems in Sustainable Agriculture
Crosslisted with: HORT 418, HORT 818, NRES 817
Prerequisites: 12 hours biological or agricultural sciences.
Description: 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.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option

NRES 418 Introduction to Remote Sensing
Crosslisted with: GEOG 418, GEOG 818, NRES 818
Prerequisites: Junior Standing
Description: Remote sensing of the earth from aerial and satellite platforms. Aerial photography, multispectral scanning, thermal imaging, microwave remote sensing techniques. Data acquisition and image analysis. Physical foundations of remote sensing using electromagnetic energy and energy-matter interactions. Applications in geographic, agricultural, environmental and natural resources analyses.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Grading Option: Graded with Option
Offered: FALL
Prerequisite for: GEOG 420, GEOG 820, GEOG 421, GEOG 821, NRES 421, NRES 821
NRES 419 Chemistry of Natural Waters
Crosslisted with: GEOL 418, GEOL 818, NRES 819, WATS 418
Prerequisites: CHEM 109 or 109A/L and 110 or 110A/L, 113 or 113A/L and 114, or CHEM 111.
Description: Principles of water chemistry and their use in precipitation, surface water, and groundwater studies. Groundwater applications used to determine the time and source of groundwater recharge, estimate groundwater residence time, identify aquifer mineralogy, examine the degree of mixing between waters of various sources and evaluate what types of biological and chemical processes have occurred during the water’s journey through the aquifer system.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option
Prerequisite for: GEOL 418L, GEOL 818L, NRES 819L, WATS 418L; GEOG 917, NRES 917

NRES 419L Chemistry of Natural Waters Laboratory
Crosslisted with: GEOL 418L, GEOL 818L, NRES 819L, WATS 418L
Prerequisites: CHEM 109 or CHEM 109A and 109L and CHEM 110 or CHEM 110A and 110L or CHEM 113 or CHEM 113A and 113L and 114; GEOL 418 or parallel.
Description: Basic laboratory techniques used to perform water analysis including various wet chemical techniques, instrument use (AA, IC, UV-Visible) and computer modeling. Techniques for sample collection and preservation, parameter estimation and chemical analysis.
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 1
Grading Option: Graded with Option

NRES 420 Applications of Remote Sensing in Agriculture and Natural Resources
Crosslisted with: AGRO 419, GEOG 419, GEOL 419, AGRO 819, GEOG 819, GEOL 819, NRES 820
Notes: GEOG 418/NRES 418 recommended
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
Grading Option: Graded with Option

NRES 421 Field Techniques in Remote Sensing
Crosslisted with: GEOG 421, GEOG 821, NRES 821
Prerequisites: NRES 418/818
Description: Field techniques as they relate to remote-sensing campaigns. Research methods, systematic approaches to data collection, field spectroscopy, collecting ancillary information linked with spectroscopic data sets as well as aircraft or satellite missions and subsequent analyses of acquired data.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option

NRES 422 Laboratory Earth: Earth's Changing Systems
Crosslisted with: NRES 822
Description: Fundamental concepts related to understanding Earth's changing natural systems in the past, present, and the future. The cycling of matter and energy; the relationship between human activity and environmental change; and the consequence of these relationships.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option

NRES 423 Integrated Resources Management
Crosslisted with: NRES 823
Prerequisites: Senior standing, natural resources or related major.
Description: Integrated and multiple-use management. Economic, political, social, and physical impacts on natural resources management priorities.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option

NRES 424 Forest Ecology
Crosslisted with: NRES 824
Prerequisites: NRES 220 or BIOS 207
Description: The structure and function of forest ecosystems including their response to global change; emphasis on forest succession and disturbance regimes in order to understand the dynamics of forested landscapes.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option

NRES 426 Invasive Plants
Crosslisted with: AGRO 426, AGRO 826, HORT 426, HORT 826, NRES 826
Prerequisites: AGRO/HORT/SOIL 153; AGRO/HORT 131
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
Grading Option: Graded with Option
Offered: SPRING

NRES 427 Introduction to the Global Positioning System (GPS)
Crosslisted with: GEOG 427, GEOG 827, NRES 827
Prerequisites: Junior standing.
Notes: Familiarity with mapping and GIS recommended.
Description: Integrated lectures, lab exercises and field experience provide an understanding of GPS technology and applications. Students will learn to collect, correct and use GPS data in a geographic information system (GIS) environment.
Credit Hours: 2
Max credits per semester: 2
Max credits per degree: 2
Grading Option: Graded with Option
Offered: SPRING
NRES 428 Leadership in Public Organizations
Crosslisted with: ALEC 428, ALEC 828, NRES 828
Prerequisites: Junior standing
Description: Leadership in theories, research, and practices in public organizations and natural resource agencies.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option

NRES 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
Grading Option: Graded with Option

NRES 431 Waterfowl Ecology and Management
Crosslisted with: NRES 831
Prerequisites: NRES 311
Description: Ecology and identification of North American waterfowl, management of habitats and populations, and current management issues.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option

NRES 432 Programming, Scripting, and Automation for GIS
Crosslisted with: GEOG 432, GEOG 832
Prerequisites: GEOG 217
Notes: Practical experience or other formal preparation in GIS may be substituted for prerequisite by permission.
Description: GIS-focused programming, scripting, and spatial analysis using the Python and R programming languages. Topics include: the ArcPy library, algorithm development, open source geospatial libraries, and the manipulation and analysis of geospatial data.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option
Offered: SPRING

NRES 433 Wildlife Management Techniques
Crosslisted with: NRES 833
Prerequisites: NRES 311
Description: Survey of methods used to obtain data and make decisions for wildlife management. Scientific methods for wildlife science; monitoring and surveys; construction of management plans; habitat use, classification, and management; harvest management.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option
ACE: ACE 10 Integrated Product

NRES 434 Environmental Education and Interpretation
Crosslisted with: NRES 834, ENVR 434
Notes: Requires 20 hours of service.
Description: Examination of formal and informal environmental education and interpretation. Knowledge, application and practice relevant to science teachers and park, extension, museums, and zoo educators.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option

NRES 435 Agroecology
Crosslisted with: AGRO 435, AGRO 835, HORT 435, NRES 835
Prerequisites: For AGRO/HORT/NRES 435: Senior standing. For AGRO/NRES 835: 12 hrs biological or agricultural sciences.
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
Grading Option: Graded with Option
ACE: ACE 10 Integrated Product

NRES 436 Evolution of Cenozoic Mammals
Crosslisted with: GEOL 436, GEOL 836, NRES 836
Prerequisites: GEOL 103
Description: Survey of mammalian evolution with emphasis on the origin, radiation, and phylogenetic relationships of Cenozoic fossil mammals. Overview of climatic and ecological changes affecting mammalian adaptations and hands on experience with specimens.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option
Prerequisite for: GEOL 935

NRES 438 Grassland Conservation: Planning and Management
Crosslisted with: NRES 838
Prerequisites: UG: Junior Standing; Grad: None
Notes: Recommended: introductory ecology and introductory soils courses
Description: Apply fundamental grassland ecology principles to grassland conservation and identify grassland establishment and management practices appropriate for different environmental and cultural situations. Based on field study, critically analyze management options and outcomes for several grasslands and develop a management plan for a grassland resource.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option
Offered: FALL
ACE: ACE 10 Integrated Product
NRES 439 Environmental Laboratory Instrumentation and Methods
Crosslisted with: NRES 839
Prerequisites: CHEM 106A & CHEM 106L or CHEM 110A and CHEM 110L
Description: Exposure to technologies such as spectroscopy, discrete automated colorimetry, chromatography and mass spectrometry used for environmental testing. Hands-on training in calibration, operation and sample analysis, proper use of analytical balance, volumetric glassware and micropropettes, creating and maintaining a laboratory notebook, and development and understanding standard operational procedures. Advanced in-lab training in analytical laboratory techniques and operation of advanced instrumentation used in commercial and research environmental laboratories.
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 1
Grading Option: Graded
Offered: FALL/SPR

NRES 440 Great Plains Ecosystem
Crosslisted with: AGRO 440, AGRO 840, NRES 840, RNGE 440, GRAS 440
Prerequisites: Junior standing.
Description: 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.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option
Offered: SPRING

NRES 441 Zoo Keeping and Management
Description: Examine and build on the knowledge, skills and abilities needed to work in a zoo in various capacities including animal keeping, guest services and curation. Acquire knowledge in all aspects needed to manage zoos including individual species care, collections, guest services, species conservation, and AZA accreditation. Become familiar with the concepts and challenges associated with the biological, educational, ethical, and administrative aspects of zoo science through partnerships and interactions with local zoos.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded
Offered: FALL/SPR
ACE: ACE 10 Integrated Product

NRES 442 Wildland Plants
Crosslisted with: AGRO 442, AGRO 842, NRES 842, RNGE 442, GRAS 442
Prerequisites: Junior standing.
Notes: AGRO/HORT 131 or LIFE 121 and 121L or equivalent recommended
Description: 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, forbs, shrubs, exotic and wetland plants.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option
Offered: FALL

NRES 444 Ecosystem Monitoring and Assessment
Crosslisted with: AGRO 444, AGRO 844, NRES 844, RNGE 444, GRAS 444
Prerequisites: Junior standing.
Notes: NRES 220 or equivalent, recommended.
Description: 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.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option
Offered: FALL

NRES 445 Human Remains in Forensic Science
Crosslisted with: FORS 445, FORS 845, NRES 845
Prerequisites: LIFE 120/L and LIFE 121/L, CHEM 109 or CHEM 109A/L, CHEM 110 or CHEM 110A/L, and FORS 120/L.
Description: Forensic anthropology within the broader context of forensic sciences and physical anthropology. Decomposition and bone modification through artificial means. Determination of individual identity, diet, chronic pathology and cause of death from human remains.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Grading Option: Graded with Option
Offered: FALL

NRES 446 Pollen Analysis for Behavioral, Biological and Forensic Science
Crosslisted with: FORS 446, FORS 846, NRES 846
Prerequisites: BIOS 109 and FORS 120.
Description: Collection, processing, identification of common North American pollen types. Pollination ecology relating to scene reconstruction. Fundamental statistics and presentation requirements for a legal and scientific audience.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Grading Option: Graded with Option
Offered: FALL

NRES 447 Archaeoparasitology: The Archaeology of Disease
Crosslisted with: NRES 847
Description: Study of parasites, their hosts, and the relationship between them. Human parasitology is especially interesting due to the adaptation of human populations to a great variety of parasites over long periods of time in the global diversity of environments. Fundamental understanding of human-parasite relations and methods of recovery of parasites from a variety of archaeological remains.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option
Offered: FALL
| Course Code | Course Title                                      | Crosslisted with | Prerequisites                                                                 | Description                                                                 | Notes                                                                 | Credit Hours | Max credits per semester | Max credits per degree | Grading Option        | Offered       |
|------------|--------------------------------------------------|------------------|-------------------------------------------------------------------------------|-----------------------------------------------------------------------------|----------------------------------------------------------------------|--------------|-------------------------|-----------------------|-------------------------|---------------|------------------------|
| NRES 448   | Advanced Topics in Wildlife Damage Management    | NRES 848         | NRES 348.                                                                     | Description: Economic, global, and public policy issues relative to situations in which wildlife damage personal property or natural resources, threaten human health and safety, or are a nuisance. Demonstration and discussion of technological advances in fertility control, damage resistance, toxicology, behavioral modification, and biological management. |                                                                      | 2            | 2                       | 2                     | Graded with Option   | SPRING       |
| NRES 450   | Biology of Wildlife Populations                  | BIOS 450, BIOS 850, NRES 850 | NRES 311; MATH 104 or above; STAT 218 or equivalent                          | Description: Principles of population dynamics. Management strategies (for consumptive and nonconsumptive fish and wildlife species) presented utilizing principles developed. |                                                                      | 4            | 4                       | 4                     | Graded with Option   | SPRING       |
| NRES 451   | Soils, Water, and Environmental Chemistry        | ENVE 851, NRES 851 | NRES/WATS/SOIL/AGRO/GEOL 361 or graduate standing                           | Description: Environmental chemistry related to the fate and transport of organic contaminants in soil-water environments. Application of computer simulation models (i.e., MODFLOW) for predicting contaminant fate in aquifers. Basic chemical and biological principles of remediating contaminated soil and water. |                                                                      | 4            | 4                       | 4                     | Graded with Option   | SPRING       |
| NRES 452   | Climate and Society                              | AGRO 450, GEOG 450, METR 450, AGRO 850, GEOG 850, METR 850, NRES 852 | Junior standing or above.                                                     | Description: Impact of climate and extreme climatic events on society and societal responses to those events. Global in scope and interdisciplinary. | Notes: Offered spring semester of even-numbered calendar years.       | 3            | 3                       | 3                     | Graded with Option   | SPRING       |
| NRES 453   | Hydrology                                        | NRES 853         | MATH 102 or above                                                             | Notes: Not available for credit for engineering students and not a substitute for CIVE 456. | Description: Introduction to the principles of hydrology, with emphasis on the components of the hydrologic cycle: precipitation, evaporation, groundwater flow, surface runoff, infiltration, precipitation runoff relationships. | 3            | 3                       | 3                     | Graded with Option   | SPRING       |
| NRES 454   | Ecological Interactions                          | BIOS 454, BIOS 854, NRES 854 | LIFE 121; LIFE 121L; BIOS 207 or NRES 220; Senior Standing                  | Description: Nature and characteristics of populations and communities. Interactions within and between populations in community structure and dynamics. Direct and indirect interactions and ecological processes, competition, predation, parasitism, herbivory, and pollination. Structure, functioning and persistence of natural communities, foodweb dynamics, succession, and biodiversity. |                                                                      | 3            | 3                       | 3                     | Graded           | SPRING       |
| NRES 455   | Soil Chemistry and Mineralogy                    | AGRO 455, AGRO 855, NRES 855, SOIL 455 | AGRO/HORT/SOIL 153 or GEOL 101; CHEM 109A/L and 110A/L; CHEM 221 or 251     | 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. | Forms and functions of organic matter in soil.                        | 3            | 3                       | 3                     | Graded           | SPRING       |
| NRES 456   | Mathematical Models in Biology                   | BIOS 456, BIOS 856, NRES 856 | LIFE 120; LIFE 120L; LIFE 121; LIFE 121L; MATH 107 | Description: Biological systems, from molecules to ecosystems, are analyzed using mathematical techniques. Strengths and weaknesses of mathematical approaches to biological questions. Brief review of college level math; introduction to modeling; oscillating systems in biology; randomness in biology; review of historically important and currently popular models in biology. |                                                                      | 3            | 3                       | 3                     | Graded with Option   | SPRING       |
NRES 457 Green Space and Urban Forestry Management
Crosslisted with: NRES 857, HORT 457
Prerequisites: Junior or senior standing, Graduate student or permission
Description: A focus on the management of trees, parks, and green infrastructure in rural and urban communities. Perspectives from community planning, landscape architecture, urban forestry, natural resources, horticulture, and environmental policy. Development and implementation of green space and forest management plans encompassing societal needs and biological limitations in rural and urban communities.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option
Offered: SPRING
ACE: ACE 10 Integrated Product

NRES 458 Soil Physical Determinations
Crosslisted with: AGRO 458, AGRO 858, 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
Grading Option: Graded with Option

NRES 459 Limnology
Crosslisted with: BIOS 459, BIOS 859, NRES 859, WATS 459
Prerequisites: 12 hrs BIOS, including BIOS/NRES 220/BIOS220x; two semesters CHEM.
Description: Physical, chemical, and biological processes that occur in fresh water. Organisms occurring in fresh water and their ecology; biological productivity of water and its causative factors; eutrophication and its effects.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Grading Option: Graded with Option
Prerequisite for: BIOS 866, NRES 866
ACE: ACE 10 Integrated Product

NRES 460 Soil Microbial Ecology
Crosslisted with: AGRO 460, BIOS 460, SOIL 460, AGRO 860, BIOS 860, NRES 860
Prerequisites: Senior standing.
Notes: Recommend having a strong science background, including courses from the agronomic, environmental, microbiology, engineering or medicine disciplines.
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
Grading Option: Graded with Option

NRES 461 Soil Physics
Crosslisted with: AGRO 461, GEOL 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
Grading Option: Graded with Option
Prerequisite for: AGEN 955, AGRO 955, CIVE 955, GEOL 985

NRES 462 Conservation Biology
Crosslisted with: NRES 862
Prerequisites: 12 hours of biological sciences, including NRES 220 and NRES 222 or equivalent.
Description: Current issues in conservation biology. Theoretical principles from the areas of ecology and genetics to effectively preserve and manage biological diversity and small populations.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option

NRES 463 Fisheries Science
Crosslisted with: NRES 863
Description: Fisheries biology emphasizing the determination and evaluation of vital statistics for the management of fish populations. Basis of specific management techniques. May also be offered at Cedar Point Biological Station.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option
ACE: ACE 10 Integrated Product
NRES 463 Fisheries Science Lab
Crosslisted with: NRES 863L
Description: Field and laboratory skills needed for fisheries biology emphasizing the determination and evaluation of vital statistics for the management of fish populations. Applied data collection and fish sampling techniques will be used. May also be offered at Cedar Point Biological Station.
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 1
Grading Option: Graded with Option

NRES 464 Fisheries Biology
Crosslisted with: BIOS 464, BIOS 864, NRES 864
Prerequisites: BIOS/NRES 489/889 or equivalent.
Description: Biology of fishes. Factors that affect fishes in the natural environment. Techniques used in the analysis and management of fish populations.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option

NRES 465 Soil Geomorphology and Paleopedology
Crosslisted with: GEOL 465, GEOL 865, NRES 865
Prerequisites: GEOL 450/850 and NRES 477/877.
Description: Soils and paleosols as evidence in reconstruction landscape evolution and paleoenvironments. Role of paleosols in stratigraphy.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option

NRES 467 Global Climate Change
Crosslisted with: METR 483, METR 883, NRES 867
Prerequisites: Junior standing, and METR 475/875.
Notes: Offered fall semester of even-numbered calendar years.
Description: Elements of climate systems, El Nino/La Nina cycle and monsoons, natural variability of climate on interannual and interdecadal scales. Paleoclimate, and future climate, developed climate change scenarios and climate change impacts on natural resources and the environment.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option

NRES 468 Wetlands
Crosslisted with: BIOS 458, NRES 868, WATS 468, BSEN 468, BSEN 868
Prerequisites: CHEM 109 or CHEM 109A and 109L and CHEM 110 or CHEM 110A and 110L, or CHEM 105 or CHEM 105A and 105L and CHEM 106 or CHEM 106A and 106L; Junior or Senior Standing.
Notes: Offered even-numbered calendar years.
Description: Physical, chemical and biological processes that occur in wetlands; the hydrology and soils of wetland systems; organisms occurring in wetlands and their ecology wetland creation, delineation, management and ecotoxicology.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Grading Option: Graded with Option

NRES 469 Bio-Atmospheric Instrumentation
Crosslisted with: AGRO 469, GEOG 469, HORT 407, METR 469, MSYM 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
Grading Option: Graded with Option

NRES 470 Lake and Reservoir Restoration
Prerequisites: 12 hrs NRES or related fields.
Description: Theory, processes, and mechanisms underlying lake and reservoir water quality degradation and/or pollution and remediation of eutrophcations and its effects. Current techniques used to restore and protect degraded lakes.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option

NRES 472 Applied Soil Physics
Crosslisted with: AGRO 472, AGRO 872, NRES 872, SOIL 472, WATS 472
Prerequisites: AGRO/HORT/SOIL 153; MATH 102 or MATH 104 or MATH 106.
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
Grading Option: Graded with Option
Offered: FALL

NRES 474 Herpetology
Crosslisted with: BIOS 474, BIOS 874, NRES 874
Prerequisites: BIOS/NRES 386 and permission.
Notes: BIOS 388 recommended.
Description: BIOS/NRES 386 and permission.
Notes: BIOS 388 recommended.
Description: Fossil and living amphibians and reptiles. Anatomy, classification, ecology and evolution.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Grading Option: Graded with Option
NRES 475 Water Quality Strategy
Crosslisted with: NRES 875, SOCI 475, SOCI 875, SOIL 475, WATS 475, AGRO 475, AGRO 875, GIVE 475, GIVE 875, CRPL 475, CRPL 875, GEOL 475, GEOL 875, MSYM 475, MSYM 875, POLS 475, POLS 875
Prerequisites: Senior standing.
Description: Holistic approach to the selection and analysis of planning strategies for protecting water quality from nonpoint sources of contamination. Introduction to the use of methods of analyzing the impact of strategies on whole systems and subsystems; for selecting strategies; and for evaluating present strategies.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option

NRES 476 Mammalogy
Crosslisted with: BIOS 476, BIOS 876, NRES 876
Prerequisites: 8 hrs BIOS; BIOS/NRES 386 or NRES 311.
Notes: May also be offered at Cedar Point Biological Station. Field trips are required and may occur outside of scheduled class time. Lab and field time emphasize diversity of mammalian families and species identification of Nebraska mammals.
Description: Evolution, natural history, ecology, and functional morphology of planetary mammals and mammals of the Northern Great Plains.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Grading Option: Graded with Option

NRES 477 Great Plains Field Pedology
Crosslisted with: AGRO 477, GEOG 467, 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
Grading Option: Graded with Option

NRES 478 Regional Climatology
Crosslisted with: METR 478, METR 878, NRES 878
Prerequisites: NRES/METR 370.
Description: Regional differentiation of the climates of the earth on both a descriptive and dynamic basis. The chief systems of climatic classification.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option

NRES 479 Hydroclimatology
Crosslisted with: METR 479, WATS 479, BSEN 479, NRES 879, METR 879, BSEN 879
Prerequisites: NRES 208 or METR 100 or METR/NRES 370.
Notes: Offered spring semester of even-numbered calendar years.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option

NRES 481 Stream and River Ecology
Crosslisted with: WATS 481, WATS 881, BIOS 481
Prerequisites: NRES 222 or equivalent
Description: Fundamental physical drivers operating in stream and river ecosystems and how those vary in space and time. Major classes of organisms associated with stream ecosystems and their functional roles. Fundamental controls on biotic diversity in stream and river ecosystems and its variance. Major aspects of stream ecosystem function including energy flow and nutrient cycling. Ecosystem services provided by stream and river ecosystems and causes and consequences of human impacts on streams and rivers. Underlying principles of bioassessment and current methods of stream restoration.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Grading Option: Graded

NRES 482 Ecophysiology of Wildlife
Crosslisted with: NRES 882
Prerequisites: NRES 220 or BIOS 207; AGRO 215/BIOS 206; BIOS 386
Description: Evaluation of the conserved physiological principles that are broadly used across animal groups, as well as the many unique adaptations used by specific taxa. Focuses on all major vertebrate groups, including fish, birds, mammals, reptiles and amphibians, and links the physiological mechanisms that allow them to survive to the environments in which they live. Highlights methods scientists use to gather physiological information, and the ways in which this information can be used by scientists in a variety of different fields.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded

NRES 484 Water Resources Seminar
Crosslisted with: AGRO 484, GEOG 484, GEOG 484, WATS 484, NRES 884, AGRO 884, GEOG 884, GEOL 884, WATS 884
Prerequisites: Junior or above standing
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
Grading Option: Graded with Option
NRES 485 Natural Resources Seminar
Crosslisted with: NRES 885
Description: Active listening and critical thinking activities related to seminars on current natural resources research and issues in Nebraska, the Great Plains, and throughout the world.
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 1
Grading Option: Graded
Offered: FALL

NRES 486A Professional Certifications: Certified Interpretive Guide
Crosslisted with: NRES 886A
Description: Professional certification from the National Association of Interpretation. Practical skills for developing quality interpretive programs for museum, nature center, zoo and park visitors. Theoretical foundations of interpretation.
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 1
Grading Option: Graded

NRES 486B Professional Certifications: Certified Interpretive Host
Crosslisted with: NRES 886B
Description: Receive professional certification from the National Association of Interpretation. Practical skills for staff and volunteers of museums, nature centers, zoos and parks to provide quality customer service.
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 1
Grading Option: Graded

NRES 487 Introduction to Landscape Ecology
Crosslisted with: LARC 487
Prerequisites: AGRO/HORT/SOIL 153 and BIOS/NRES 220.
Notes: HORT/LARC/GEOG 200, CIVE 353/853/NRES 853, and CRPL 470 recommended.
Description: The history, principles, and concepts of landscape ecology. Use and application of landscape structure, function in the planning, the design, and management of human and natural landscapes.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded

NRES 488 Groundwater Geology
Crosslisted with: GEOL 488, GEOL 888, NRES 888
Prerequisites: GEOL 100-level course; MATH 106 or equivalent.
Description: Occurrence, movement, and development of water in the geologic environment.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option
Prerequisite for: AGEN 955, AGRO 955, CIVE 955, GEOL 985; GEOL 470, GEOL 870; GEOL 889, NRES 887; GEOL 986; NRES 918

NRES 489 Ichthyology
Crosslisted with: BIOS 489, BIOS 889, NRES 889
Prerequisites: LIFE 120 and LIFE 121
Notes: May also be offered at Cedar Point Biological Station.
Description: Fishes, their taxonomy, physiology, behavior, and ecology. Dynamics of fish stocks and factors regulating their production.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Grading Option: Graded with Option
Prerequisite for: BIOS 464, BIOS 864, NRES 464, NRES 864

NRES 491 Special Topics in Geography
Crosslisted with: GEOG 491, GEOG 891
Description: Topics vary.
Credit Hours: 1-6
Min credits per semester: 1
Max credits per semester: 6
Max credits per degree: 6
Grading Option: Graded with Option

NRES 492 International Study Tours in Natural Resource Management
Crosslisted with: NRES 492H, NRES 892
Prerequisites: Permission.
Notes: Off-campus travel may be required. Choice of subject matter and coordination of on- and off-campus study is at the discretion of the instructor.
Description: Group educational tours to sites that illustrate the diversity of approaches to natural resources management found around the world.
Credit Hours: 1-3
Min credits per semester: 1
Max credits per semester: 3
Max credits per degree: 6
Grading Option: Graded with Option
ACE: ACE 9 Global/Diversity

NRES 492H International Study Tours in Natural Resource Management
Crosslisted with: NRES 492, NRES 892
Prerequisites: Permission.
Notes: Off-campus travel may be required. Choice of subject matter and coordination of on- and off-campus study is at the discretion of the instructor.
Description: Group educational tours to sites that illustrate the diversity of approaches to natural resources management found around the world.
Credit Hours: 1-3
Min credits per semester: 1
Max credits per semester: 3
Max credits per degree: 6
Grading Option: Graded with Option
ACE: ACE 9 Global/Diversity

NRES 495 Grasslands Seminar
Crosslisted with: AGRO 495, ENTO 495, GRAS 495, HORT 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
Grading Option: Graded with Option
NRES 496 Independent Study
Prerequisites: 12 hrs natural resource sciences or closely-related fields, and permission.
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
Grading Option: Graded with Option

NRES 497 Career Experiences in Natural Resource Sciences
Prerequisites: Sophomore standing; School of Natural Resources (SNR) majors; permission and advanced approval of a plan of work.
Description: Off-campus work experiences sponsored by natural resource agencies, companies, and organizations. Students collaborate in the development of a plan of work that will identify student responsibilities, including a final written report.
Credit Hours: 1-6
Min credits per semester: 1
Max credits per semester: 6
Max credits per degree: 12
Grading Option: Grade Pass/No Pass Option

NRES 498 Special Topics in Natural Resources
Crosslisted with: NRES 898
Prerequisites: 6 hrs NRES or equivalent.
Description: Current issues in natural resource sciences.
Credit Hours: 1-6
Min credits per semester: 1
Max credits per semester: 6
Max credits per degree: 12
Grading Option: Graded with Option

NRES 499 Thesis Research
Prerequisites: Permission of thesis adviser.
Notes: Requires conducting a scholarly research project and writing an undergraduate thesis.
Credit Hours: 3-6
Min credits per semester: 3
Max credits per semester: 6
Max credits per degree: 6
Grading Option: Grade Pass/No Pass Option

NRES 499H Honors Thesis
Prerequisites: Admission to the University Honors Program and permission.
Notes: AGRI 299H recommended.
Description: Conduct a scholarly research project and write a University Honors Program or undergraduate thesis.
Credit Hours: 3-6
Min credits per semester: 3
Max credits per semester: 6
Max credits per degree: 6
Grading Option: Graded

NRES 800 Sampling, Data Management and Visualization
Prerequisites: Graduate standing is required.
Description: Implement best practices for scientific computing. Practice with a scientific workflow from the design of the sampling scheme, through generation of the data in the field or lab, up to the point of analysis. Understand cognitive constraints on visualization. Use modern software tools to produce publication quality data visualizations.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Grade Pass/No Pass Option

NRES 801 Topics in Applied Ecology
Description: A survey of ecological and sociological frameworks used in the applied ecological research. Emphasis on fisheries and wildlife, grasslands, forests, aquatic habitats, and human dimensions of natural resources.
Credit Hours: 2
Max credits per semester: 2
Max credits per degree: 2
Grading Option: Pass No-Pass
Offered: FALL

NRES 802 Aquatic Insects
Crosslisted with: BIOS 485, BIOS 885, ENTO 402, ENTO 802, NRES 402
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
Prerequisite for: BIOS 485L, BIOS 885L, ENTO 402L, ENTO 802L, NRES 402L, NRES 802L

NRES 802L Identification of Aquatic Insects
Crosslisted with: BIOS 485L, BIOS 885L, ENTO 402L, ENTO 802L, NRES 402L
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
Grading Option: Grade Pass/No Pass Option

NRES 803 Ecological Statistics
Crosslisted with: STAT 803
Prerequisites: STAT 801 or equivalent; prior experience with "R" software
Notes: Available online
Description: Model-based inference for ecological data, generalized linear and additive models, mixed models, survival analysis, multi-model inference and information theoretic model selection, and study design.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Grading Option: Grade Pass/No Pass Option
NRES 804 Program Planning & Evaluation
Description: Learn concepts from the social sciences relevant to planning and evaluating education, extension, and behavior change programs and initiatives. Learn to develop an evaluation protocol and collect data for planning and evaluating programs.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded
Offered: SPRING

NRES 805 Conservation Behavior
Description: Learn communication and social psychology theories and techniques to improve science communication, educational programs, and environmentally responsible behavior change.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded
Offered: FALL/SPR

NRES 806 Plant Ecophysiology: Theory and Practice
Crosslisted with: AGRO 806, HORT 406, HORT 806, NRES 406, 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
Grading Option: Grade Pass/No Pass Option

NRES 807 Plant-Water Relations
Crosslisted with: AGRO 807
Prerequisites: AGRO 325 or equivalent; MATH 106 recommended
Description: Quantitative study of water relations in the soil-plant-atmosphere system. Basic physical processes, which describe the movement of water in the soil and the atmosphere, and the physiological processes, which describe water movement inside of the plant. Stomata physiology and the effects of internal water deficits on photosynthesis, respiration, nitrogen metabolism, cell division and cell enlargement. Results from integrative models used to study the relative importance of environmental versus physiological factors for several plant-environment systems.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Grade Pass/No Pass Option
Offered: FALL

NRES 808 Microclimate: The Biological Environment
Crosslisted with: AGRO 408, GEOG 408, HORT 408, METR 408, NRES 408, WATS 408, AGRO 808, GEOG 808, HORT 808, METR 808
Prerequisites: Junior standing, MATH 106 or equivalent, 5 hrs physics, major in any of the physical or biological sciences or engineering.
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
Grading Option: Grade Pass/No Pass Option
Prerequisite for: AGRO 907, HORT 907, METR 907, NRES 907; BSEN 954, NRES 954

NRES 809 Laboratory Earth: Earth and Its Systems
Description: The earth as a system and the "real world" applications of fundamental physical science processes in this system. Interaction of energy and matter in the geosphere, in the hydrosphere, and in the atmosphere. The earth's relationships to the sun, moon, and other astronomical objects in the solar system.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Grade Pass/No Pass Option

NRES 810 Landscape Ecology
Crosslisted with: HORT 812
Prerequisites: 12 hrs biological sciences or related fields including BIOS 320
Description: Spatial arrangements of ecosystems, the interaction among component ecosystems through the flow of energy, materials and organisms, and alteration of this structure through natural or anthropogenic forces.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Grade Pass/No Pass Option

NRES 811 Plant Tissue Culture
Crosslisted with: BIOS 811, HORT 811
Description: Survey of techniques used in plant cell, tissue and organ culture, including current research. Laboratory emphasizes practical manipulation of plant cells, tissues, and organs, including examples from woody and herbaceous plant species.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Grading Option: Grade Pass/No Pass Option
NRES 812 Introduction to Geographic Information Systems
Crosslisted with: GEOG 412, GEOG 812, NRES 412
Description: Introduction to conceptual foundations and applications of computer-based geographic information systems (GIS). GIS database development, spatial data analysis, spatial modeling, GIS implementation and administration.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Grading Option: Grade Pass/No Pass Option
Prerequisite for: GEOG 422, GEOG 822; GEOG 922, NRES 922

NRES 813 Environmental Leadership
Crosslisted with: ALEC 410, ALEC 810, NRES 413
Prerequisites: Junior standing.
Notes: Offered on the World Wide Web (WWW) fall semester of odd-numbered years and in the classroom fall semester of even-numbered years.
Description: Major leaders in conservation and ecology that emphasizes agricultural and cultural issues and relationships with the environment.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Grade Pass/No Pass Option

NRES 814 Laboratory Earth: Earth's Natural Resource Systems
Description: Fundamental concepts in the Earth and physical sciences in the understanding of Earth's natural resource systems. Rock and mineral, water, soil, and energy resources. Social factors, human dependence, and the impact of these on natural resource systems.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Grade Pass/No Pass Option

NRES 815 GIS for Agriculture and Natural Resources
Crosslisted with: NRES 415
Prerequisites: NRES 312
Description: Principles of digitizing earth observations. Manipulate spatial data, create maps, and conduct spatial analyses. Use GIS to analyze and solve real-world questions in agriculture and natural resources.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Grading Option: Graded
Offered: FALL

NRES 817 Agroforestry Systems in Sustainable Agriculture
Crosslisted with: HORT 418, HORT 818, NRES 417
Prerequisites: 12 hours biological or agricultural sciences.
Description: 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.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Grade Pass/No Pass Option

NRES 818 Introduction to Remote Sensing
Crosslisted with: GEOG 418, GEOG 818, NRES 418
Prerequisites: Junior Standing
Description: Remote sensing of the earth from aerial and satellite platforms. Aerial photography, multispectral scanning, thermal imaging, microwave remote sensing techniques. Data acquisition and image analysis. Physical foundations of remote sensing using electromagnetic energy and energy-matter interactions. Applications in geographic, agricultural, environmental and natural resources analyses.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Grading Option: Grade Pass/No Pass Option
Offered: FALL
Prerequisite for: GEOG 420, GEOG 820; GEOG 421, GEOG 821, NRES 421, NRES 821

NRES 819 Chemistry of Natural Waters
Crosslisted with: GEOL 418, GEOL 818, NRES 419, WATS 418
Prerequisites: CHEM 109 or 109A/L and 110 or 110A/L, 113 or 113A/L and 114, or CHEM 111.
Description: Principles of water chemistry and their use in precipitation, surface water, and groundwater studies. Groundwater applications used to determine the time and source of groundwater recharge, estimate groundwater residence time, identify aquifer mineralogy, examine the degree of mixing between waters of various sources and evaluate what types of biological and chemical processes have occurred during the water's journey through the aquifer system.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Grade Pass/No Pass Option
Prerequisite for: GEOL 418L, GEOL 818L, NRES 419L, NRES 819L, WATS 418L; GEOL 917, NRES 917

NRES 819L Chemistry of Natural Waters Laboratory
Crosslisted with: GEOL 418L, GEOL 818L, NRES 419L, WATS 418L
Prerequisites: CHEM 109 or CHEM 109A and 109L and CHEM 110 or CHEM 110A and 110L or CHEM 113 or CHEM 113A and 113L and 114; GEOL 418 or parallel.
Description: Basic laboratory techniques used to perform water analysis including various wet chemical techniques, instrument use (AA, IC, UV-Visible) and computer modeling. Techniques for sample collection and preservation, parameter estimation and chemical analysis.
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 1
Grading Option: Grade Pass/No Pass Option

NRES 820 Applications of Remote Sensing in Agriculture and Natural Resources
Crosslisted with: AGRO 419, GEOG 419, GEOL 419, NRES 420, AGRO 819, GEOG 819, GEOL 819
Notes: GEOG 418/NRES 418 recommended
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
Grading Option: Grade Pass/No Pass Option
NRES 821 Field Techniques in Remote Sensing  
Crosslisted with: GEOG 421, GEOG 821, NRES 421  
Prerequisites: NRES 418/818  
Description: Field techniques as they relate to remote-sensing campaigns. Research methods, systematic approaches to data collection, field spectroscopy, collecting ancillary information linked with spectroscopic data sets as well as aircraft or satellite missions and subsequent analyses of acquired data.  
Credit Hours: 3  
Max credits per semester: 3  
Max credits per degree: 3  
Grading Option: Grade Pass/No Pass Option  

NRES 822 Laboratory Earth: Earth's Changing Systems  
Crosslisted with: NRES 422  
Description: Fundamental concepts related to understanding Earth's changing natural systems in the past, present, and the future. The cycling of matter and energy; the relationship between human activity and environmental change; and the consequence of these relationships.  
Credit Hours: 3  
Max credits per semester: 3  
Max credits per degree: 3  
Grading Option: Grade Pass/No Pass Option  

NRES 823 Integrated Resources Management  
Crosslisted with: NRES 423  
Prerequisites: Natural resource science or related major  
Description: Integrated and multiple-use management. Economic, political, social, and physical impacts on natural resources management priorities.  
Credit Hours: 3  
Max credits per semester: 3  
Max credits per degree: 3  
Grading Option: Grade Pass/No Pass Option  

NRES 824 Forest Ecology  
Crosslisted with: NRES 424  
Prerequisites: NRES 220 or BIOS 207  
Description: The structure and function of forest ecosystems including their response to global change; emphasis on forest succession and disturbance regimes in order to understand the dynamics of forested landscapes.  
Credit Hours: 3  
Max credits per semester: 3  
Max credits per degree: 3  
Grading Option: Grade Pass/No Pass Option  
Offered: SPRING  

NRES 825 Geostatistics  
Crosslisted with: GEOL 825  
Prerequisites: MATH 106 and STAT 218  
Notes: Offered fall semester of odd-numbered calendar years.  
Description: Practical methods for solving spatial interpolation and related estimation problems with emphasis on geostatistical methods. Introduction to applied statistical simulation and prediction in geology, hydrogeology and environmental studies.  
Credit Hours: 3  
Max credits per semester: 3  
Max credits per degree: 3  
Grading Option: Grade Pass/No Pass Option  

NRES 826 Invasive Plants  
Crosslisted with: AGRO 426, AGRO 826, HORT 426, HORT 826, NRES 426  
Prerequisites: AGRO/HORT/SOIL 153; AGRO/HORT 131  
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  
Grading Option: Grade Pass/No Pass Option  

NRES 827 Introduction to the Global Positioning System (GPS)  
Crosslisted with: GEOG 427, GEOG 827, NRES 427  
Prerequisites: Junior standing.  
Notes: Familiarity with mapping and GIS recommended.  
Description: Integrated lectures, lab exercises and field experience provide an understanding of GPS technology and applications. Students will learn to collect, correct and use GPS data in a geographic information system (GIS) environment.  
Credit Hours: 2  
Max credits per semester: 2  
Max credits per degree: 2  
Grading Option: Grade Pass/No Pass Option  

NRES 828 Leadership in Public Organizations  
Crosslisted with: ALEC 428, ALEC 828, NRES 428  
Prerequisites: Junior standing.  
Description: Leadership in theories, research, and practices in public organizations and natural resource agencies.  
Credit Hours: 3  
Max credits per semester: 3  
Max credits per degree: 3  
Grading Option: Grade Pass/No Pass Option  

NRES 829 Human Dimensions of Natural Resource Management  
Description: Introduction to, and understanding of, human dimensions of natural resource management. Interdisciplinary theories and frameworks for understanding and addressing natural resources management will be examined. Historical, psychological, cultural, and social influences will be reviewed. Integrative approaches to sustainable ecosystem management will also be explored.  
Credit Hours: 3  
Max credits per semester: 3  
Max credits per degree: 3  
Grading Option: Grade Pass/No Pass Option  

NRES 829A 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  
Grading Option: Grade Pass/No Pass Option
NRES 830 Laboratory Earth: Climate Research Applications
Description: Climate-change issues serve as a context to develop research questions and design a discrete, locally oriented research project through which they define a problem, analyze data, and develop conclusions to potentially impact decision-making in their community. Designed for science educators. NRES 830 is offered fall semesters.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Grade Pass/No Pass Option

NRES 831 Waterfowl Ecology and Management
Crosslisted with: NRES 431
Prerequisites: NRES 311.
Description: Ecology and identification of North American waterfowl, management of habitats and populations, and current management issues.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Grade Pass/No Pass Option

NRES 832 Laboratory Earth: Human Dimensions of Climate Change
Description: Examine science behind global climate change. Use primary data sets to understand the implications for climate change at global and regional/local scales. Focus on potential impacts on human systems including drought, sea level rise, severe weather and populations most likely to be impacted by climate change. Designed for science educators. NRES 832 is offered spring semesters.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Grade Pass/No Pass Option

NRES 833 Wildlife Management Techniques
Crosslisted with: NRES 433
Prerequisites: NRES 311.
Description: Survey of methods used to obtain data and make decisions for wildlife management. Scientific methods for wildlife science; monitoring and surveys; construction of management plans; habitat use, classification, and management; harvest management.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Grade Pass/No Pass Option

NRES 834 Environmental Education and Interpretation
Crosslisted with: NRES 434, ENVR 434
Notes: Requires 20 hours of service
Description: Examination of formal and informal environmental education and interpretation. Knowledge, application and practice relevant to science teachers and park, extension, museums, and zoo educators.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Grade Pass/No Pass Option

NRES 835 Agroecology
Crosslisted with: AGRO 435, AGRO 835, HORT 435, NRES 435
Prerequisites: For AGRO/HORT/NRES 435: Senior standing. For AGRO/NRES 835: 12 hrs biological or agricultural sciences.
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
Grading Option: Grade Pass/No Pass Option

NRES 836 Evolution of Cenozoic Mammals
Crosslisted with: GEOL 436, GEOL 836, NRES 436
Prerequisites: GEOL 103
Description: Survey of mammalian evolution with emphasis on the origin, radiation, and phylogenetic relationships of Cenozoic fossil mammals. Overview of climatic and ecological changes affecting mammalian adaptations and hands on experience with specimens.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Grade Pass/No Pass Option
Prerequisite for: GEOL 935

NRES 837 Adaptive Natural Resource Management
Description: From cultural taboos to the current socio-ecological framework, the art and science of natural resource management has and continues to evolve. The primary focus of this course is to introduce students to the concepts of structured decision making and adaptive management, but in doing so the course will explore the history of natural resource management and the various management paradigms that have and continue to dominate resource management. At the completion of this course students will have an understanding of the theory and practice of adaptive management as well as an understanding of why we continue to move toward a more transparent and scientific methodology of natural resource management.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded

NRES 838 Grassland Conservation: Planning and Management
Crosslisted with: NRES 438
Prerequisites: UG: Junior Standing; Grad: None
Notes: Recommended: introductory ecology and introductory soils courses
Description: Apply fundamental grassland ecology principles to grassland conservation and identify grassland establishment and management practices appropriate for different environmental and cultural situations. Based on field study, critically analyze management options and outcomes for several grasslands and develop a management plan for a grassland resource.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Grade Pass/No Pass Option
Offered: FALL
NRES 839 Environmental Laboratory Instrumentation and Methods
Crosslisted with: NRES 439
Prerequisites: CHEM 106A & CHEM 106L or CHEM 110A and CHEM 110L
Description: Exposure to technologies such as spectroscopy, discrete automated colorimetry, chromatography and mass spectrometry used for environmental testing. Hands-on training in calibration, operation and sample analysis, proper use of analytical balance, volumetric glassware and micropipettes, creating and maintaining a laboratory notebook, and development and understanding standard operational procedures. Advanced in-lab training in analytical laboratory techniques and operation of advanced instrumentation used in commercial and research environmental laboratories.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded
Offered: FALL/SPR

NRES 840 Great Plains Ecosystem
Crosslisted with: AGRO 440, AGRO 840, RNGE 440, NRES 440, GRAS 440
Prerequisites: Junior standing.
Description: 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.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Grade Pass/No Pass Option
Offered: SPRING

NRES 841 STEM Education Seminar
Crosslisted with: GEOS 811
Prerequisites: Graduate student in a science, technology, engineering, or mathematics (STEM) discipline.
Notes: This seminar is designed for graduate students interested in STEM education in formal or informal environments with children or adult learners.
Description: Acquire familiarity with the broad range of current STEM education research, outreach, and other activities taking place at UNL and across the nation in order to build a larger context for and connections to one’s own STEM research and activities.
Credit Hours: 1-3
Min credits per semester: 1
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Grade Pass/No Pass Option
Offered: FALL

NRES 844 Ecosystem Monitoring and Assessment
Crosslisted with: AGRO 444, AGRO 844, RNGE 444, NRES 444, GRAS 444
Prerequisites: Junior standing.
Notes: NRES 220 or equivalent, recommended.
Description: 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.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Grade Pass/No Pass Option
Offered: FALL

NRES 845 Human Remains in Forensic Science
Crosslisted with: FORS 445, FORS 845, NRES 445
Prerequisites: LIFE 120/L and LIFE 121/L, CHEM 109 or CHEM 109A/L, CHEM 110 or CHEM 110A/L, and FORS 120/L.
Description: Forensic anthropology within the broader context of forensic sciences and physical anthropology. Decomposition and bone modification through artificial means. Determination of individual identity, diet, chronic pathology and cause of death from human remains.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Grading Option: Grade Pass/No Pass Option
Offered: FALL

NRES 846 Pollen Analysis for Behavioral, Biological and Forensic Science
Crosslisted with: FORS 446, FORS 846, NRES 446
Prerequisites: BIOS 109 and FORS 120.
Description: Collection, processing, identification of common North American pollen types. Pollination ecology relating to scene reconstruction. Fundamental statistics and presentation requirements for a legal and scientific audience.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Grading Option: Grade Pass/No Pass Option
Offered: FALL

NRES 847 Archaeoparasitology: The Archaeology of Disease
Crosslisted with: NRES 447
Description: Study of parasites, their hosts, and the relationship between them. Human parasitology is especially interesting due to the adaptation of human populations to a great variety of parasites over long periods of time in the global diversity of environments. Fundamental understanding of human-parasite relations and methods of recovery of parasites from a variety of archaeological remains.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Grade Pass/No Pass Option
Offered: FALL

NRES 842 Wildland Plants
Crosslisted with: AGRO 442, AGRO 842, RNGE 442, NRES 442, GRAS 442
Prerequisites: Junior standing.
Notes: AGRO/HORT 131 or LIFE 121 and 121L or equivalent recommended
Description: 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, forbs, shrubs, exotic and wetland plants.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Grade Pass/No Pass Option
Offered: FALL
NRES 848 Advanced Topics in Wildlife Damage Management
Crosslisted with: NRES 448
Prerequisites: NRES 348
Description: Economic, global, and public policy issues relative to situations in which wildlife damage personal property or natural resources, threaten human health and safety, or are a nuisance. Demonstration and discussion of technological advances in fertility control, damage resistance, toxicology, behavioral modification, and biological management.
Credit Hours: 4
Max credits per semester: 2
Max credits per degree: 2
Grading Option: Grade Pass/No Pass Option

NRES 849 Woody Plant Growth and Development
Crosslisted with: BIOS 849, HORT 849
Prerequisites: CHEM 251 and AGRO 325
Description: Plant growth and development specifically of woody plants as viewed from an applied whole-plant physiological level. Plant growth regulators, structure and secondary growth characteristics of woody plants, juvenility, senescence, abscission and dormancy.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Grade Pass/No Pass Option

NRES 850 Biology of Wildlife Populations
Crosslisted with: BIOS 450, BIOS 850, NRES 450
Prerequisites: NRES 311; MATH 104 or above; STAT 218 or equivalent
Description: Principles of population dynamics. Management strategies (for consumptive and nonconsumptive fish and wildlife species) presented utilizing principles developed.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Grading Option: Grade Pass/No Pass Option
Offered: SPRING

NRES 851 Soils, Water, and Environmental Chemistry
Crosslisted with: ENVE 851, NRES 451
Prerequisites: NRES/WATS/SOIL/AGRO/GEOL 361 or graduate standing
Description: Environmental chemistry related to the fate and transport of organic contaminants in soil-water environments. Application of computer simulation models (i.e., MODFLOW) for predicting contaminant fate in aquifers. Basic chemical and biological principles of remediating contaminated soil and water.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Grading Option: Grade Pass/No Pass Option
Offered: SPRING

NRES 852 Climate and Society
Crosslisted with: AGRO 455, AGRO 855, NRES 455, SOIL 455
Prerequisites: AGRO/HORT/SOIL 153 or GEOL 101; CHEM 109A/L and 110A/L; CHEM 221 or 251.
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
Grading Option: Grade Pass/No Pass Option
Offered: SPRING

NRES 853 Hydrology
Crosslisted with: NRES 453
Prerequisites: MATH 102 or above
Notes: Not available for credit for engineering students and not a substitute for CIVE 456.
Description: Introduction to the principles of hydrology, with emphasis on the components of the hydrologic cycle: precipitation, evaporation, groundwater flow, surface runoff, infiltration, precipitation runoff relationships.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Grade Pass/No Pass Option
Offered: SPRING

NRES 854 Ecological Interactions
Crosslisted with: BIOS 454, BIOS 854, NRES 454
Prerequisites: LIFE 121; LIFE 121L; BIOS 207 or NRES 220; Senior Standing
Description: Nature and characteristics of populations and communities. Interactions within and between populations in community structure and dynamics. Direct and indirect interactions and ecological processes, competition, predation, parasitism, herbivory, and pollination. Structure, functioning and persistence of natural communities, foodweb dynamics, succession, and biodiversity.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded

NRES 855 Soil Chemistry and Mineralogy
Crosslisted with: AGRO 455, AGRO 855, NRES 455, SOIL 455
Prerequisites: AGRO/HORT/SOIL 153 or GEOL 101; CHEM 109A/L and 110A/L; CHEM 221 or 251.
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. Forms and functions of organic matter in soil.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Grade Pass/No Pass Option
Offered: SPRING
**NRES 856 Mathematical Models in Biology**
**Crosslisted with:** BIOS 456, BIOS 856, NRES 456  
**Prerequisites:** LIFE 120, LIFE 120L; LIFE 121; LIFE 121L; MATH 107  
**Description:** Biological systems, from molecules to ecosystems, are analyzed using mathematical techniques. Strengths and weaknesses of mathematical approaches to biological questions. Brief review of college level math; introduction to modeling; oscillating systems in biology; randomness in biology; review of historically important and currently popular models in biology.  
**Credit Hours:** 3  
**Max credits per semester:** 3  
**Max credits per degree:** 3  
**Grading Option:** Grade Pass/No Pass Option

**NRES 857 Green Space and Urban Forestry Management**  
**Crosslisted with:** NRES 457, HORT 457  
**Prerequisites:** Junior or senior standing, Graduate student.  
**Description:** A focus on the management of trees, parks, and green infrastructure in rural and urban communities. Perspectives from community planning, landscape architecture, urban forestry, natural resources, horticulture, and environmental policy. Development and implementation of green space and forest management plans encompassing societal needs and biological limitations in rural and urban communities.  
**Credit Hours:** 3  
**Max credits per semester:** 3  
**Max credits per degree:** 3  
**Grading Option:** Grade Pass/No Pass Option  
**Offered:** SPRING

**NRES 858 Soil Physical Determinations**  
**Crosslisted with:** AGRO 458, AGRO 858, NRES 458, 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  
**Grading Option:** Grade Pass/No Pass Option

**NRES 859 Limnology**  
**Crosslisted with:** BIOS 459, BIOS 859, NRES 459, WATS 459  
**Prerequisites:** 12 hrs BIOS, including BIOS/NRES 220/BIOS220x; two semesters CHEM.  
**Description:** Physical, chemical, and biological processes that occur in fresh water. Organisms occurring in fresh water and their ecology; biological productivity of water and its causative factors; eutrophication and its effects.  
**Credit Hours:** 4  
**Max credits per semester:** 4  
**Max credits per degree:** 4  
**Grading Option:** Grade Pass/No Pass Option  
**Prerequisite for:** BIOS 866, NRES 866

**NRES 860 Soil Microbial Ecology**  
**Crosslisted with:** AGRO 460, BIOS 460, NRES 460, SOIL 460, AGRO 860, BIOS 860  
**Prerequisites:** Senior standing.  
**Notes:** Recommend having a strong science background, including courses from the agronomic, environmental, microbiology, engineering or medicine disciplines.  
**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  
**Grading Option:** Grade Pass/No Pass Option

**NRES 861 Soil Physics**  
**Crosslisted with:** AGRO 461, GEOL 461, NRES 461, SOIL 461, WATS 461, AGRO 861, GEOL 861  
**Prerequisites:** AGRO/SOIL 153; PHYS 141 or equivalent, one semester of calculus.  
**Description:** Principles of soil physics. Movement of water, air, heat, and solutes in soils. Water retention and movement, including infiltration and field water regime. Movement of chemicals in soils.  
**Credit Hours:** 3  
**Max credits per semester:** 3  
**Max credits per degree:** 3  
**Grading Option:** Grade Pass/No Pass Option  
**Offered:** SPRING

**NRES 862 Conservation Biology**  
**Crosslisted with:** NRES 462  
**Prerequisites:** 12 hours of biological sciences, including NRES 220 and NRES 222 or equivalent.  
**Description:** Current issues in conservation biology. Theoretical principles from the areas of ecology and genetics to effectively preserve and manage biological diversity and small populations.  
**Credit Hours:** 3  
**Max credits per semester:** 3  
**Max credits per degree:** 3  
**Grading Option:** Grade Pass/No Pass Option

**NRES 863 Fisheries Science**  
**Crosslisted with:** NRES 463  
**Description:** Fisheries biology emphasizing the determination and evaluation of vital statistics for the management of fish populations. Basis of specific management techniques. May also be offered at Cedar Point Biological Station.  
**Credit Hours:** 3  
**Max credits per semester:** 3  
**Max credits per degree:** 3  
**Grading Option:** Grade Pass/No Pass Option
NRES 863L Fisheries Science Lab
Crosslisted with: NRES 463L
Description: Field and laboratory skills needed for fisheries biology emphasizing the determination and evaluation of vital statistics for the management of fish populations. Applied data collection and fish sampling techniques will be used. May also be offered at Cedar Point Biological Station.
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 1
Grading Option: Grade Pass/No Pass Option

NRES 864 Fisheries Biology
Crosslisted with: BIOS 464, BIOS 864, NRES 464
Prerequisites: BIOS/NRES 489/889 or equivalent.
Description: Biology of fishes. Factors that affect fishes in the natural environment. Techniques used in the analysis and management of fish populations.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Grade Pass/No Pass Option

NRES 865 Soil Geomorphology and Paleopedology
Crosslisted with: GEOL 465, GEOL 865, NRES 465
Prerequisites: GEOL 450/850 and NRES 477/877
Description: Soils and paleosols as evidence in reconstruction landscape evolution and paleoenvironments. Role of paleosols in stratigraphy.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Grade Pass/No Pass Option

NRES 866 Advanced Limnology
Crosslisted with: BIOS 866
Prerequisites: NRES 859 or equivalent
Description: In-depth consideration of selected areas of limnology including stream limnology, primary production, secondary production, nutrient cycling, and eutrophication.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Grade Pass/No Pass Option

NRES 867 Global Climate Change
Crosslisted with: METR 483, METR 883, NRES 467
Prerequisites: Junior standing; and METR 475/875.
Notes: Offered fall semester of even-numbered calendar years.
Description: Elements of climate systems, El Nino/LaNina cycle and monsoons, natural variability of climate on interannual and interdecadal scales. Paleoclimate, and future climate, developed climate change scenarios and climate change impacts on natural resources and the environment.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Grade Pass/No Pass Option

NRES 868 Wetlands
Crosslisted with: BIOS 458, NRES 468, WATS 468, BSEN 468, BSEN 868
Prerequisites: CHEM 109 or CHEM 109A and 109L and CHEM 110 or CHEM 110A and 110L, or CHEM 105 or CHEM 105A and 105L and CHEM 106 or CHEM 106A and 106L; Junior or Senior Standing.
Notes: Offered even-numbered calendar years.
Description: Physical, chemical and biological processes that occur in wetlands; the hydrology and soils of wetland systems; organisms occurring in wetlands and their ecology wetland creation, delineation, management and ecotoxicology.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Grading Option: Grade Pass/No Pass Option

NRES 869 Bio-Atmospheric Instrumentation
Crosslisted with: AGRO 469, GEOG 469, HORT 407, METR 469, MSYM 469, NRES 469, AGRO 869, GEOG 869, HORT 807, METR 869, MSYM 869
Prerequisites: Junior standing; MATH 106; 4 hrs physics; physical or biological science major.
Description: Discussion and practical application of principles and practices of measuring meteorological and related variables near the earth's surface including temperature, humidity, precipitation, pressure, radiation and wind. Performance characteristics of sensors and modern data collection methods are discussed and evaluated.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Grade Pass/No Pass Option

NRES 870 Lake and Reservoir Restoration
Prerequisites: 12 hrs NRES or related fields
Description: Theory, processes, and mechanisms underlying lake and reservoir water quality degradation and/or pollution. Remediation of eutrophication and its effects. Current techniques used to restore and protect degraded lakes.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Grade Pass/No Pass Option

NRES 871 Quantitative Fishery Assessment
Notes: Offered spring semester of even numbered calendar years.
Description: Advanced quantitative techniques of fishery science required to support management practices targeted at populations (recruitment, growth and mortality), communities (e.g., predator-prey interactions) and ecosystems (e.g., bio-stressors).
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Grade Pass/No Pass Option
Offered: SPRING
NRES 872 Applied Soil Physics
Crosslisted with: AGRO 472, AGRO 872, NRES 472, SOIL 472, WATS 472
Prerequisites: AGRO/HORT/SOIL 153; MATH 102 or MATH 104 or MATH 106.
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
Grading Option: Grade Pass/No Pass Option
Offered: FALL

NRES 873 Ecological Anthropology
Crosslisted with: ANTH 473, ANTH 873
Description: Human adaptive systems and their ecological contexts. The dynamic inter-relationships between subsistence, technology, social behavior, human demography, and ecological variability.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Grade Pass/No Pass Option
Groups: CAS Diversity in the US

NRES 874 Herpetology
Crosslisted with: BIOS 474, BIOS 874, NRES 474
Prerequisites: BIOS/NRES 386 and permission.
Notes: BIOS 386 recommended.
Description: Fossil and living amphibians and reptiles. Anatomy, classification, ecology and evolution.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Grading Option: Grade Pass/No Pass Option

NRES 875 Water Quality Strategy
Crosslisted with: NRES 475, SOCI 475, SOCI 875, SOIL 475, WATS 475, AGRO 475, AGRO 875, CIVE 475, CIVE 875, CRPL 475, CRPL 875, GEOL 475, GEOL 875, MSYM 475, MSYM 875, POLS 475, POLS 875
Prerequisites: Senior standing.
Notes: Capstone course.
Description: Holistic approach to the selection and analysis of planning strategies for protecting water quality from nonpoint sources of contamination. Introduction to the use of methods of analyzing the impact of strategies on whole systems and subsystems; for selecting strategies; and for evaluating present strategies.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Grade Pass/No Pass Option

NRES 876 Mammmalogy
Crosslisted with: BIOS 476, BIOS 876, NRES 476
Prerequisites: 8 hrs BIOS; BIOS/NRES 386 or NRES 311.
Notes: May also be offered at Cedar Point Biological Station. Field trips are required and may occur outside of scheduled class time. Lab and field time emphasize diversity of mammalian families and species identification of Nebraska mammals.
Description: Evolution, natural history, ecology, and functional morphology of planetary mammals and mammals of the Northern Great Plains.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Grading Option: Grade Pass/No Pass Option

NRES 877 Great Plains Field Pedology
Crosslisted with: AGRO 477, GEOG 467, NRES 477, SOIL 477, GEOG 867
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
Grading Option: Grade Pass/No Pass Option

NRES 878 Regional Climatology
Crosslisted with: METR 478, METR 878, NRES 478
Prerequisites: NRES/METR 370.
Description: Regional differentiation of the climates of the earth on both a descriptive and dynamic basis. The chief systems of climatic classification.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Grade Pass/No Pass Option

NRES 879 Hydroclimatology
Crosslisted with: NRES 479, METR 479, WATS 479, BSEN 479, METR 879, BSEN 879
Prerequisites: NRES 208 or METR 100 or METR/NRES 370.
Notes: Offered spring semester of even-numbered calendar years.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Grade Pass/No Pass Option
NRES 880 Vertebrate Population Analysis
Notes: NRES 880 is offered spring semester of even years.
Description: Introduction to the estimation of demographic parameters from surveys and mark-recapture data. Emphasizes analytical skills used to estimate population vital rates, such as abundance, density, population size, survival rates, home range size, and movement rates. Reinforces use of multiple hypotheses in scientific investigations, as well as model selection processes.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Grading Option: Grade Pass/No Pass Option
Offered: SPRING

NRES 881 Environmental Conflict Management
Description: This two-day short-course is designed to aid students development of theoretically grounded practical approaches to facilitate and manage environmental conflict. The course will provide students with skills to perform well in conflict situations and help students manage conflict in diverse environmental contexts. The program blends presentations, group discussions, conflict analysis, and strategy design exercises and simulations into a highly engaging learning environment. Participants learn from each other and develop personalized tools that can be applied immediately. Two-day short-course taught fall semester of even numbered years.
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 1
Grading Option: Graded

NRES 882 Ecophysiology of Wildlife
Crosslisted with: NRES 482
Prerequisites: NRES 220 or BIOS 207; AGRO 215/BIOS 206; BIOS 386
Description: Evaluation of the conserved physiological principles that are broadly used across animal groups, as well as the many unique adaptations used by specific taxa. Focuses on all major vertebrate groups, including fish, birds, mammals, reptiles and amphibians, and links the physiological mechanisms that allow them to survive to the environments in which they live. Highlights methods scientists use to gather physiological information, and the ways in this information can be used by scientists in a variety of different fields.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded

NRES 883 Ecological Economics
Crosslisted with: AECN 883, CDEV 883
Prerequisites: AECN 141 or ECON 212 or equivalent
Description: A synthesis across the notion of "utility" as represented in traditional environmental and natural resource economics, "ecology" in ecological economics, and "community" in behavioral economics. Ideas from thermodynamics with a focus on renewable resources. Development, organization, and enhancement of eco-business, eco-industry, eco-government and eco-communities.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Grade Pass/No Pass Option

NRES 884 Water Resources Seminar
Crosslisted with: AGRO 484, GEOG 484, GEOL 484, NRES 484, WATS 484, AGRO 884, GEOG 884, GEOL 884, WATS 884
Prerequisites: Junior or above standing.
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
Grading Option: Grade Pass/No Pass Option

NRES 885 Natural Resources Seminar
Crosslisted with: NRES 485
Description: Active listening and critical thinking activities related to seminars on current natural resources research and issues in Nebraska, the Great Plains, and throughout the world.
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 1
Grading Option: Graded
Offered: FALL

NRES 886A Professional Certifications: Certified Interpretive Guide
Crosslisted with: NRES 486A
Description: Professional certification from the National Association of Interpretation. Practical skills for developing quality interpretive programs for museum, nature center, zoo and park visitors. Theoretical foundations of interpretation.
Credit Hours: 2
Max credits per semester: 2
Max credits per degree: 2
Grading Option: Graded

NRES 886B Professional Certifications: Certified Interpretive Host
Crosslisted with: NRES 486B
Description: Receive professional certification from the National Association of Interpretation. Practical skills for staff and volunteers of museums, nature centers, zoos and parks to provide quality customer service.
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 1
Grading Option: Graded

NRES 887 Hydrogeology
Crosslisted with: GEOL 889
Prerequisites: GEOL 888/NRES 488 and MATH 208
Description: Principles of flow through porous media with emphasis on basic classical solutions, flow-net analysis, and elementary modern numerical solutions that aid in the analysis and development of groundwater supplies.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Grade Pass/No Pass Option
Prerequisite for: GEOL 988; NRES 918
<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>Grading Option</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>NRES 888</td>
<td>Groundwater Geology</td>
<td>GEOL 488, GEOL 888, NRES 488</td>
<td>GEOL 100-level course; MATH 106 or equivalent.</td>
<td>Occurrence, movement, and development of water in the geologic environment.</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>Grade Pass/No Pass Option</td>
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<tr>
<td>NRES 889</td>
<td>Ichthyology</td>
<td>GEOL 870; GEOL 889, NRES 887; GEOL 986; NRES 918</td>
<td>GEOL 470, AGRO 955, CIVE 955</td>
<td>Dynamics of fish stocks and factors regulating their production.</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>Grade Pass/No Pass Option</td>
<td></td>
</tr>
<tr>
<td>NRES 891</td>
<td>Seminar in Natural Resource Sciences</td>
<td>BIOS 489, BIOS 889, NRES 489</td>
<td>LIFE 120 and LIFE 121</td>
<td>Presentations of special non-thesis topics, and/or research plans, and/or thesis research results.</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>Grade Pass/No Pass Option</td>
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<tr>
<td>NRES 891A</td>
<td>Seminar: Writing in Science</td>
<td>BIOS 464, BIOS 864, NRES 464, NRES 864</td>
<td>May also be offered at Cedar Point Biological Station.</td>
<td>Fishes, their taxonomy, physiology, behavior, and ecology.</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>Grade Pass/No Pass Option</td>
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<tr>
<td>NRES 891B</td>
<td>Readings in Aquatic Ecology</td>
<td>BIOS 489</td>
<td>LIFE 120 and LIFE 121</td>
<td>Read classic (highly cited, generally 25-75 years old) papers and more recent follow-up (&lt;10 years) papers on topics relevant to many areas of aquatic ecology. The goal is to read the basis of the concepts taught in modern Limnology courses and to see how these concepts are currently evolving in the literature. Students will be responsible for choosing a topic and classic paper from a list (see below) and finding (with help) a modern follow up to the issue, and then will lead the group discussion on that topic.</td>
<td>1-3</td>
<td>1</td>
<td>1</td>
<td>Grade Pass/No Pass Option</td>
<td></td>
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<tr>
<td>NRES 892</td>
<td>International Study Tours in Natural Resource Management</td>
<td>NRES 492, NRES 492H</td>
<td>Permission.</td>
<td>Group educational tours to sites that illustrate the diversity of approaches to natural resources management found around the world.</td>
<td>1-3</td>
<td>1</td>
<td>1</td>
<td>Grade Pass/No Pass Option</td>
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<tr>
<td>NRES 896</td>
<td>Independent Study</td>
<td>AGRI 897, AGRO 897, HORT 897, ASCI 897</td>
<td>12 hrs natural resource sciences or closely-related fields; permission</td>
<td>Individual or group projects in research, literature review or extension of course work under supervision and evaluation of a departmental faculty member.</td>
<td>1-5</td>
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<td>Grade Pass/No Pass Option</td>
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<tr>
<td>NRES 897</td>
<td>Master of Applied Science Project</td>
<td>BIOS 464, BIOS 864, NRES 464, NRES 864</td>
<td>12 hrs natural resource sciences or closely-related fields; permission</td>
<td>Project activity for the Master of Applied Science degree.</td>
<td>1-6</td>
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<td>Grade Pass/No Pass Option</td>
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<tr>
<td>NRES 898</td>
<td>Special Topics in Natural Resources</td>
<td>BIOS 464, BIOS 864, NRES 464, NRES 864</td>
<td>6 hrs NRES or equivalent.</td>
<td>Current issues in natural resource sciences.</td>
<td>1-6</td>
<td>1</td>
<td>1</td>
<td>Grade Pass/No Pass Option</td>
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<tr>
<td>NRES 899</td>
<td>Masters Thesis</td>
<td>BIOS 464, BIOS 864, NRES 464, NRES 864</td>
<td>6 hrs NRES or equivalent.</td>
<td>Current issues in natural resource sciences.</td>
<td>1-6</td>
<td>1</td>
<td>1</td>
<td>Grade Pass/No Pass Option</td>
<td></td>
</tr>
</tbody>
</table>

Notes:
- Prerequisites: Admission to masters degree program and permission of major adviser.
- Grading Option: Pass No-Pass.
NRES 902 Foundations of Ecological Resilience  
Crosslisted with: AGRO 902  
Prerequisites: Graduate standing  
Description: Concept of resilience, especially ecological resilience, and resilience theory. Both theoretical and applied aspects of ecological resilience, and the development of resilience theory. Prominent issues in resilience science and applications to practical problems in natural resource management.  
Credit Hours: 3  
Max credits per semester: 3  
Max credits per degree: 3  
Grading Option: Graded  
Offered: FALL  
Groups: American Government/Public Pol Biology, Psychology, & Politics

NRES 906 Crop Growth and Yield Modeling  
Crosslisted with: AGRO 906  
Prerequisites: AGRO 325/HORT 325 Introductory Plant Physiology or equivalent  
Notes: Recommended: AGRO 406/806 NRES 406/806 HORT 406/806 Plant Ecophysiology or equivalent.  
Description: Understanding and use of crop simulation models and ability to build crop models. Studying principles and quantitative descriptions of crop production ecology. Offered fall semester of odd-numbered calendar years.  
Credit Hours: 3  
Max credits per semester: 3  
Max credits per degree: 3  
Grading Option: Grade Pass/No Pass Option

NRES 907 Agricultural Climatology  
Crosslisted with: AGRO 907, HORT 907, METR 907  
Prerequisites: NRES 808, STAT 801A or equivalent  
Description: Offered spring semester of odd-numbered calendar years. Analysis and use of climatological data as applied to agricultural activities and the use of climatological information to assist in decision making.  
Credit Hours: 3  
Max credits per semester: 3  
Max credits per degree: 3  
Grading Option: Grade Pass/No Pass Option

NRES 916 Environmental Law and Water Resource Management Seminar  
Crosslisted with: CIVE 916  
Prerequisites: Permission  
Description: An interdisciplinary seminar with the Department of Civil Engineering. Contemporary environmental issues and water resource management.  
Credit Hours: 3  
Max credits per semester: 3  
Max credits per degree: 3  
Grading Option: Grade Pass/No Pass Option

NRES 917 Environmental Isotope Hydrology  
Crosslisted with: GEOL 917  
Prerequisites: NRES 819 or equivalent  
Description: Theory and use of stable, radiogenic and radioactive isotopes in hydrologic studies. Abundance and variation of the stable isotopes of oxygen, hydrogen, carbon, sulphur, chlorine, nitrogen, and strontium. Application of the isotopes to determine water origin, movement, geochemical history, recharge age and residence time, and to delineate contaminant sources and solute migration.  
Credit Hours: 3  
Max credits per semester: 3  
Max credits per degree: 3  
Grading Option: Grade Pass/No Pass Option

NRES 918 Applied Groundwater Modeling  
Prerequisites: GEOL/NRES 488/888 or 889, MATH 208/208H, or equivalent  
Notes: Offered fall semester of odd-numbered calendar years.  
Description: Forward and backward numerical analysis of groundwater flow systems and their interactions with other hydrologic components. Groundwater model development and parameter estimation using MODFLOW, PEST, and other widely used modeling packages.  
Credit Hours: 3  
Max credits per semester: 3  
Max credits per degree: 3  
Grading Option: Grade Pass/No Pass Option

NRES 920 Xenobiotics in the Environment  
Crosslisted with: AGRO 920, ENTO 920, EOHT 920, HORT 920  
Prerequisites: Recommend one course each in organic chemistry, soil science, biochemistry, plant physiology, microbiology and ecology  
Description: Fate and ecotoxicological impacts of biologically foreign compounds in soil-water-plant environments; uptake, mechanisms of toxicity and metabolism in plants and other biota. Herbicides and other pesticides.  
Credit Hours: 3  
Max credits per semester: 3  
Max credits per degree: 3  
Grading Option: Grade Pass/No Pass Option

NRES 922 Seminar in Geographic Information Systems (GIS)  
Crosslisted with: GEOG 922  
Prerequisites: GEOG/NRES 812 and 822; or equivalent  
Description: Study of current research and trends in geographic information systems (GIS), GI Science, and GeoComputation. Advanced spatial analytical techniques and geospatial modeling emphasizing GIS applications in natural resources assessment, environmental analyses, agriculture, and land management.  
Credit Hours: 3  
Max credits per semester: 3  
Max credits per degree: 3  
Grading Option: Grade Pass/No Pass Option

NRES 935 Seminar in Historical Geography  
Crosslisted with: GEOG 935  
Description: Discussion of current literature and research on selected aspects of historical geography. Specific theme of course varies according to instructor.  
Credit Hours: 1-3  
Min credits per semester: 1  
Max credits per semester: 3  
Max credits per degree: 6  
Grading Option: Grade Pass/No Pass Option
NRES 954 Turbulent Transfer in the Atmospheric Surface Layer
Crosslisted with: BSEN 954
Prerequisites: MATH 821; MECH 310 or NRES 808 or BIOS 857; or equivalent
Notes: Offered spring semester of odd-numbered calendar years.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Grade Pass/No Pass Option

NRES 965 Managed Aquatic Systems
Description: Theoretical aspects of structure and function in aquatic systems managed for human needs, ecological processes, river-reservoir interface, energy flow (including fate and transport), population dynamics, and multiple-use systems.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Grade Pass/No Pass Option

NRES 985 Soil Carbon and Nitrogen Dynamics
Crosslisted with: AGRO 985, SOIL 985
Notes: Basic knowledge about soil biogeochemical characteristics and processes are required to take full advantage of the content delivered. Recommended courses: AGRO/SOIL 153 or AGRO 804, AGRO/SOIL 455/855, GEOL 417/817.
Description: Understand carbon and nitrogen cycling in the soil ecosystem including feedbacks and implications for soil management, environment, and climate.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded
Offered: FALL/SPR

NRES 992 General Seminar
Crosslisted with: AGRO 992, HORT 992
Notes: Agronomy and Horticulture PhD students should enroll in this course twice.
Description: Expected of all Agronomy and Horticulture graduate students. Presentation of thesis/dissertation or non-thesis topics in agronomy, horticulture or related subjects. Agronomy and Horticulture PhD students should enroll in this course twice.
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 5
Grading Option: Pass No-Pass

NRES 996 Research Other Than Thesis
Prerequisites: Permission
Credit Hours: 1-6
Min credits per semester: 1
Max credits per semester: 6
Max credits per degree: 6
Grading Option: Grade Pass/No Pass Option

NRES 999 Doctoral Dissertation
Prerequisites: Admission to doctoral degree program and permission of supervisory committee chair
Credit Hours: 1-24
Min credits per semester: 1
Max credits per semester: 24
Max credits per degree: 99
Grading Option: Pass No-Pass

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.

Natural Resource & Environmental Economics - Eco-Business & Sustainability
Natural Resource & Environmental Economics - Energy Economics
Natural Resource & Environmental Economics - Environmental Economics
Natural Resource & Environmental Economics - Water Economics

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
• Integrated Water Management Planner, The Nebraska Department of Natural Resources - Lincoln NE
• Environmental Public Health Intern, Lincoln-Lancaster County Health Department - Lincoln NE
• Environmental Health Technical Professional Worker, Lincoln Lancaster County Health Dept - Lincoln NE
• Data Analyst, C-Minus - Auburn NE
• Home Energy Assessor, Mark Group - Burlington MA
• Supply Analyst, Union Pacific - Omaha NE
• Pilot, Nebraska National Guard - Lincoln NE

Internships
• Conservation Policy Intern, Nebraska Wildlife Federation - Lincoln NE
• Environmental Marketing Intern, Li-COR Biosciences - Lincoln NE
• Sustainability Intern, Lincoln Mayor’s Office - Beutler - Lincoln NE
• Environmental Marketing Intern, Li-Cor Biosciences - Lincoln NE
• Intern, USDA - NE Farm Service Agency -
• HR/Org Development Intern, Orthman Manufacturing - Lexington NE
• Engineering Intern, EXMARK - Lincoln NE
• Intern, Sandhills Publishing - Lincoln NE
• Sales Intern, Assurity Life Insurance - Lincoln NE
• Sales Intern/Home Restoration Specialist, Home-One Roofing - Lincoln NE

**Graduate & Professional Schools**

• Masters in Agricultural Economics, University of Nebraska-Lincoln - Lincoln NE
• Masters in Management & Organizations, University of Colorado-Denver - Denver CO
• M.S. in Environmental Policy, University of Michigan - Ann Arbor MI
• M.S. in Natural Resources, University of Nebraska-Lincoln - Lincoln NE
• Masters of Public Accountancy, UNL - Lincoln NE