ENVIRONMENTAL SCIENCE

Description
An important facet of environmental science is restoration activities that initiate or accelerate the recovery of an ecosystem that has been degraded, damaged, or contaminated from human activity or natural agents. Restoration begins with a thorough understanding of the soil-water environment. Students interested in environmental science must declare an option and can choose between:

- Soil Science Option
- Lake and Stream Restoration Option

College Requirements

College Admission
Requirements for admission into the College of Agricultural Sciences and Natural Resources (CASNR) are consistent with general University admission requirements (one unit equals one high school year): 4 units of English, 4 units of mathematics, 3 units of natural sciences, 3 units of social studies, and 2 units of foreign language. Students must also meet performance requirements: ACT composite of 20 or higher OR combined SAT score of 950 or higher OR rank in the top one-half of graduating class; transfer students must have a 2.0 (on a 4.0 scale) cumulative grade point average and 2.0 on the most recent term of attendance. For students entering the PGA Golf Management degree program, a certified golf handicap of 12 or better (e.g., USGA handicap card) or written ability (MS Word file) equivalent to a 12 or better handicap by a PGA professional or high school golf coach is required. For more information, please visit: http://pgm.unl.edu/requirements.

Admission Deficiencies/Removal of Deficiencies
Students who are admitted to CASNR with core course deficiencies must remove these deficiencies within the first 30 credit hours at UNL, or within the first calendar year at Nebraska, whichever takes longer, excluding foreign languages. Students have up to 60 credit hours to remove foreign 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 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.

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

Minimum Hours Required for Graduation
The College grants the bachelor's degree in programs associated with agricultural sciences, natural resources, and related programs. Students working toward a degree must earn at least 120 semester hours of credit. A minimum cumulative grade point average of C (2.0 on a 4.0 scale) must be maintained throughout the course of studies and is required for graduation. 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 degree 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
- 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 is 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. The University of Nebraska at Omaha (UNO) cooperates with CASNR in providing four-semester pre-agricultural sciences, pre-natural resources, pre-food science and technology, pre-horticulture, and pre-turfgrass and landscape management transfer programs.

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

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

For more information, contact the CASNR Dean's Office, 800-472-8800, ext. 2541.

Non 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\(^1\) (>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 UNL and participate in prior-approved education abroad programs. University of Nebraska–Lincoln open enrollment and summer independent study courses count toward residence.

\(^1\)Includes courses taught by CASNR faculty through interdisciplinary prefixes (e.g., LIFE, MBIO, ENVR, SCIL, EAEP, HRTM, ENSC) and CASNR crosslisted courses taught by non-CASNR faculty.

**Online and Distance Education**

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

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

**Independent Study Rules**

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

Independent study projects include research, literature review or extension of 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 environmental science will be able to:

1. Describe in detail the chemical and biological processes that act on a chemical once it is released into the soil-water environment.
2. Identify the contributing factors that can lead to ground or surface water contamination and offer corrective actions to mitigate the situation.
3. Use science-based principles to measure, describe, manage, and improve soil-water environments.
4. Competitively pursue employment as an environmental scientist or soil scientist with government agencies or private-sector firms.

**Major Requirements**

**College Core Requirements**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCIL 101</td>
<td>Science and Decision-Making for a Complex World</td>
<td>3</td>
</tr>
</tbody>
</table>

Credit Hours Subtotal: 3

**Natural Resources Core**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>NRES 220</td>
<td>Principles of Ecology</td>
<td>3</td>
</tr>
<tr>
<td>NRES 312 / GEOG 312</td>
<td>Introduction to Spatial Sciences</td>
<td>3</td>
</tr>
<tr>
<td>ENSC 220</td>
<td>Introduction to Energy Systems</td>
<td>3</td>
</tr>
<tr>
<td>SOIL 153 / NRES 220</td>
<td>Soil Resources</td>
<td>4</td>
</tr>
<tr>
<td>AGRO 153 / HORT 153</td>
<td></td>
<td>13</td>
</tr>
</tbody>
</table>

Credit Hours Subtotal: 13

**Natural Sciences (ACE 4)**

Select one CASNR approved Life Sciences sequence from the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOS 101 &amp; BIOS 101L</td>
<td>General Biology and General Biology Laboratory</td>
<td>4</td>
</tr>
<tr>
<td>LIFE 120 &amp; LIFE 120L</td>
<td>Fundamentals of Biology I and Fundamentals of Biology I Laboratory</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 109</td>
<td>General Chemistry I (ACE 4)</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 110</td>
<td>General Chemistry II</td>
<td>4</td>
</tr>
</tbody>
</table>

Select one of the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 141</td>
<td>Elementary General Physics I</td>
<td>4-5</td>
</tr>
<tr>
<td>PHYS 151</td>
<td>Elements of Physics</td>
<td></td>
</tr>
<tr>
<td>PHYS 211</td>
<td>General Physics I</td>
<td></td>
</tr>
<tr>
<td>MSYM 109</td>
<td>Physical Principles in Agriculture and Life Sciences (ACE 4)</td>
<td></td>
</tr>
</tbody>
</table>

Credit Hours Subtotal: 16-17
### Mathematics and Statistics

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAT 218</td>
<td>Introduction to Statistics</td>
<td>3</td>
</tr>
</tbody>
</table>

Select one of the following: 2-5

- MATH 102  Trigonometry
- MATH 103  College Algebra and Trigonometry
- MATH 104  Applied Calculus
- MATH 106  Calculus I

Credit Hours Subtotal: 5-8

### Communications

Select one Written Communication (ACE 1) course from the following: 3

- ENGL 150  Writing and Inquiry
- ENGL 151  Writing and Argument
- ENGL 254  Writing and Communities
- JGEN 200  Technical Communication I
- JGEN 300  Technical Communication II

Select one Oral Communication (ACE 2) course from the following: 3

- ALEC 102  Interpersonal Skills for Leadership
- COMM 101  Communication in the 21st Century
- COMM 209  Public Speaking
- COMM 210  Communicating in Small Groups
- COMM 215  Visual Communication
- COMM 286  Business and Professional Communication
- MRKT 257  Sales Communication
- NRES 301  Environmental Communication Skills
- TMFD 121  Visual Communication and Presentation

Select one Communication and Interpersonal Skills elective from the following: 3

- ALEC 102  Interpersonal Skills for Leadership
- COMM 101  Communication in the 21st Century
- COMM 209  Public Speaking
- COMM 210  Communicating in Small Groups
- COMM 212  Debate
- COMM 215  Visual Communication
- COMM 286  Business and Professional Communication
- ENGL 150  Writing and Inquiry
- ENGL 151  Writing and Argument
- ENGL 252  Introduction to Fiction Writing
- ENGL 253  Introduction to Poetry Writing
- ENGL 254  Writing and Communities
- JGEN 120  Basic Business Communication
- JGEN 200  Technical Communication I
- JGEN 300  Technical Communication II
- MRKT 257  Sales Communication
- NRES 301  Environmental Communication Skills
- TMFD 121  Visual Communication and Presentation

Credit Hours Subtotal: 9

### Economics, Humanities and Social Sciences

Select one of the following: 3

- ECON 200  Economic Essentials and Issues
- ECON 211  Principles of Macroeconomics
- ECON 212  Principles of Microeconomics

### Specific Major Requirements

#### Requirements

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>AECN 141</td>
<td>Introduction to the Economics of Agriculture (ACE 6)</td>
<td></td>
</tr>
</tbody>
</table>

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

Credit Hours Subtotal: 12

Total Credit Hours: 58-62

### Soil Science Option

This option provides students an understanding of soil as a natural resource and as a component of all terrestrial ecosystems. The student will learn how soils influence ecological processes which take place above and below ground. An understanding of these processes will enable the student to deal with environmental management problems such as groundwater protection, natural resource management, urban
Environmental Science

5

and rural development issues, waste management, and pollution abatement. Careers focus on environmental assessment, soil conservation, and remediation of soil contamination. Students interested in preparing for graduate work in soils can aim toward a variety of special areas including soil microbiology, chemistry, physics, mineralogy, and morphology.

Soil Science Option Requirements

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>NRES 451</td>
<td>Soils, Water, and Environmental Chemistry</td>
<td>4 (ACE 10)</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>SOIL 460 / AGRO 460 / BIOS 460 / NRES 460</td>
<td>Soil Microbiology</td>
<td>3</td>
</tr>
<tr>
<td>SOIL 461 / AGRO 461 / GEOL 461 / NRES 461 / WATS 461</td>
<td>Soil Physics</td>
<td>3</td>
</tr>
<tr>
<td>CIVE 326 / BSEN 326</td>
<td>Introduction to Environmental Engineering</td>
<td>3</td>
</tr>
<tr>
<td>BSEN 355</td>
<td>Introduction to Ecological Engineering</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 455 / AGRO 455 / SOIL 455</td>
<td>Soil Chemistry and Mineralogy</td>
<td>3</td>
</tr>
<tr>
<td>SOIL 269 / AGRO 269</td>
<td>Principles of Soil Management</td>
<td>3</td>
</tr>
<tr>
<td>SOIL 453 / AGRO 453 / HORT 453 / LARC 453</td>
<td>Urban Soil Properties and Management</td>
<td>3</td>
</tr>
<tr>
<td>NRES 477 / AGRO 477 / GEOG 476 / SOIL 477</td>
<td>Great Plains Field Pedology</td>
<td>4</td>
</tr>
</tbody>
</table>

Credit Hours Subtotal: 14

Other Soil Science Option Electives

Select 5-9 hours from the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSEN 455 / BSEN 254</td>
<td>Nonpoint Source Pollution Control</td>
<td>3</td>
</tr>
<tr>
<td>CIVE 455</td>
<td>Engineering</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 251 / CHEM 253</td>
<td>Organic Chemistry I and Organic Chemistry I Laboratory</td>
<td>3</td>
</tr>
</tbody>
</table>

Lake and Stream Restoration Option

This option is designed for students considering careers in water quality, aquatic ecology, or limnology. The student will learn the important biotic, physical, and chemical processes that occur within lakes and streams and be prepared to environmentally manage problems related to water quality. Students will also be prepared to implement pollution abatement procedures or management practices associated with lake and stream restoration. Careers focus on environmental assessment, water conservation, and remediation of lakes and streams. Completion of this program also provides excellent preparation for graduate study.

Lake & Stream Restoration Option Requirements

Select one sequence from the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEOL 470</td>
<td>Field Techniques in Hydrogeology</td>
<td>3</td>
</tr>
<tr>
<td>GEOL 488 / NRES 488</td>
<td>Groundwater Geology</td>
<td>3</td>
</tr>
</tbody>
</table>

Natural Resource Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>NRES 279 / AGRO 279 / SOIL 279</td>
<td>Soil Evaluation</td>
<td>3</td>
</tr>
<tr>
<td>NRES 399</td>
<td>Independent Research</td>
<td>3</td>
</tr>
<tr>
<td>NRES 412 / GEOG 412</td>
<td>Introduction to Geographic Information</td>
<td>3</td>
</tr>
<tr>
<td>NRES 418 / GEOG 418</td>
<td>Introduction to Remote Sensing</td>
<td>3</td>
</tr>
<tr>
<td>NRES 427 / GEOG 427</td>
<td>Introduction to the Global Positioning</td>
<td>3</td>
</tr>
<tr>
<td>NRES 455 / AGRO 455 / SOIL 455</td>
<td>Soil Chemistry and Mineralogy</td>
<td>3</td>
</tr>
<tr>
<td>NRES 468</td>
<td>Wetlands</td>
<td>3</td>
</tr>
<tr>
<td>NRES 496</td>
<td>Independent Study</td>
<td>3</td>
</tr>
<tr>
<td>NRES 497</td>
<td>Career Experiences in Natural Resource Sciences</td>
<td>3</td>
</tr>
</tbody>
</table>

Plant Pathology Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLPT 270 / AGRO 270 / HORT 270 / NRES 270</td>
<td>Biological Invaders</td>
<td>3</td>
</tr>
</tbody>
</table>

Soil Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOIL 269 / AGRO 269</td>
<td>Principles of Soil Management</td>
<td>3</td>
</tr>
<tr>
<td>SOIL 366 / AGRO 366</td>
<td>Soil Nutrient Relationships</td>
<td>3</td>
</tr>
<tr>
<td>SOIL 453 / AGRO 453 / HORT 453 / LARC 453</td>
<td>Urban Soil Properties and Management</td>
<td>3</td>
</tr>
</tbody>
</table>

Credit Hours Subtotal: 5-9

Total Credit Hours: 19-23

1 Engineering courses are recommended, however, because of prerequisites, students wishing to enroll in these courses should first seek counsel from their advisor and then request permission from instructor.

2 This course can be taken more than once.

Lake and Stream Restoration Option

This option is designed for students considering careers in water quality, aquatic ecology, or limnology. The student will learn the important biotic, physical, and chemical processes that occur within lakes and streams and be prepared to environmentally manage problems related to water quality. Students will also be prepared to implement pollution abatement procedures or management practices associated with lake and stream restoration. Careers focus on environmental assessment, water conservation, and remediation of lakes and streams. Completion of this program also provides excellent preparation for graduate study.

Lake & Stream Restoration Option Requirements

Select one sequence from the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEOL 424</td>
<td>Biogeochemical Cycles</td>
<td>3</td>
</tr>
</tbody>
</table>
Select one from the following: 3-4

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>NRES 470</td>
<td>Lake and Reservoir Restoration</td>
</tr>
<tr>
<td>NRES 468</td>
<td>Wetlands</td>
</tr>
<tr>
<td>BSEN 355</td>
<td>Introduction to Ecological Engineering</td>
</tr>
<tr>
<td>NRES 481 /</td>
<td>Stream and River Ecology</td>
</tr>
<tr>
<td>BIOS 481 /</td>
<td></td>
</tr>
<tr>
<td>WATS 481</td>
<td></td>
</tr>
<tr>
<td>ACE 10</td>
<td>Soil, Water, and Environmental Chemistry</td>
</tr>
<tr>
<td>or WATS 475</td>
<td>Water Quality Strategy</td>
</tr>
</tbody>
</table>

Credit Hours Subtotal: 14-16

Other Lake & Stream Restoration Option Electives
Select 4-10 hours from the following: 4-10

Biological Sciences Courses
- BIOS 381  Invertebrate Zoology
- BIOS 454 / Ecological Interactions
- NRES 454
- BIOS 457 / Ecosystem Ecology
- GEOL 457

Biological Systems Engineering Courses
- BSEN 422 / Pollution Prevention: Principles and Practices
- CIVE 422
- BSEN 455 / Nonpoint Source Pollution Control
- CIVE 455 Engineering

Entomology Courses
- ENTO 402 / Aquatic Insects
- BIOS 485 / and Identification of Aquatic Insects
- NRES 402
- & ENTO 402L / BIOS 485L / NRES 402L

Chemistry Courses
- CHEM 251  Organic Chemistry I
- & CHEM 253 and Organic Chemistry I Laboratory

Natural Resources Courses
- NRES 211 Introduction to Conservation Biology
- NRES 312 / Introduction to Spatial Sciences
- GEOG 312
- NRES 388 / Employment Seminar
- AGRI 388
- NRES 412 / Introduction to Geographic Information
- GEOG 412 Systems
- NRES 418 / Introduction to Remote Sensing
- GEOG 418
- NRES 419 / Chemistry of Natural Waters
- GEOL 418 / and Chemistry of Natural Waters Laboratory
- WATS 418
- & NRES 419L / GEOL 418L / WATS 418L

Applying for Remote Sensing in Agriculture and Natural Resources
- NRES 420 / AGRO 419 / GEOL 419 / GEOG 419
- NRES 421 / GEOG 421
- NRES 427 / Introduction to the Global Positioning System (GPS)
- NRES 431 Waterfowl Ecology and Management
- NRES 463 Fisheries Science
- NRES 464 / BIOS 464
- NRES 468 / WATS 468
- NRES 475 / AGRO 475 / CIVE 475 / CRPL 475 / GEOG 475 / MSYM 475 / POLS 475 / SOCI 475 / SOIL 475 / WATS 475

Water Quality Strategy
- NRES 484 / AGRO 484 / GEOG 484 / GEOL 484 / WATS 484

Water Resources Seminar
- NRES 489 Ichthyology
- NRES 497 Career Experiences in Natural Resource Sciences

Plant Pathology Courses
- PLPT 270 / Biological Invaders
- AGRO 270 / HORT 270 / NRES 270

Credit Hours Subtotal: 18-26

Because of prerequisites, students wishing to enroll in these courses should first seek counsel from their advisor and then request permission from instructor.

Requirements for Minor Offered by Department

Environmental Science Minor

Category 1 – Required Courses
- NRES 281 / Introduction to Water Science
- AGRO 281 / GEOG 281 / WATS 281
- SOIL 153 / Soil Resources
- AGRO 153 / HORT 153
**Soils, Environment and Water Quality**

- SOIL 361 / AGRO 361 / GEOL 361 / NRES 361 / WATS 361

Credit Hours Subtotal: 3

**Great Plains Field Pedology**

- SOIL 477 / AGRO 477 / GEOG 467 / NRES 477

Credit Hours Subtotal: 4

**Category 2 – Advanced Courses**

Select 6 hours from the following:

- NRES 319 Fundamentals of Environmental Sampling
- NRES 320 Fundamentals of Environmental Sampling Laboratory
- NRES 451 Soils, Water, and Environmental Chemistry
- SOIL 354 / MSYM 354 / WATS 354 Soil Conservation and Watershed Management
- NRES 477 Great Plains Field Pedology (if not taken in Category 1)
- SOIL 455 / AGRO 455 / NRES 455 Soil Chemistry and Mineralogy
- SOIL 460 / AGRO 460 / NRES 460 / BIOS 460 Soil Microbiology
- SOIL 461 / AGRO 461 / GEOL 461 / NRES 461 / WATS 461 Soil Physics
- SOIL 453 / AGRO 453 / HORT 453 / LARC 453 Urban Soil Properties and Management
- WATS 475 / AGRO 475 / CIVE 475 / CRPL 475 / GEOL 475 / MSYM 475 / NRES 475 / POLS 475 / SOCI 475 / SOIL 475 Water Quality Strategy

Credit Hours Subtotal: 6

**Category 3 – Related Courses**

Select one of the following: 3-4

- CIVE 326 / BSEN 326 Introduction to Environmental Engineering
- BSEN 355 Introduction to Ecological Engineering
- NRES 312 / GEOG 312 Introduction to Spatial Sciences
- NRES 412 / GEOG 412 Introduction to Geographic Information

Credit Hours Subtotal: 3-4

Total Credit Hours 23-24

**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.

**Environmental Science - Lake & Stream Restoration**

**Environmental Science - Soil Science**

**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**

- Technical Sales, LI-COR Biosciences - Lincoln NE
- Soil Scientist, USDA-NRCS - Powell WY
- Integrated Water Management Planner, The Nebraska Department of Natural Resources - Lincoln NE
- Soil Conservationist, Natural Resource Conservation Service - Central City NE
- Ecologist, Forrest Preserve District - IL
- Young for Preventative Maintenance Associate, University of Nebraska-Lincoln - Lincoln NE