Department of Biology

(College of Humanities, Arts and Sciences)

www.biology.uni.edu

The Department of Biology offers the following undergraduate and graduate programs. Specific requirements for these programs are listed within this Department of Biology section in the following order:

Undergraduate Major (B.S.)

- Biology (p. 2)
- Environmental Science (p. 2) (also listed in Department of Earth and Environmental Sciences)

Undergraduate Majors (B.A.)

- Biology (p. 4)
- Biology: Biomedical Emphasis (p. 5)
- Biology: Ecology, Evolution and Organismal Biology Emphasis (p. 6)
- Biology-Teaching (p. 7)
- Combined B.A./M.S. or B.S./M.S. Program Biology (p. 8)
- Environmental Resource Management (p. 8) (also listed in Department of Geography, Department of Earth and Environmental Sciences, and Department of Health, Recreation and Community Services)

Minors

- Biology (p. 13)
- Biology-Teaching (p. 14)

Graduate Major (M.S.)

- Biology (p. 14)

Major programs are offered by the Department of Biology in two baccalaureate areas: the Bachelor of Arts and the Bachelor of Science. The Bachelor of Science degree is recommended for most students preparing for graduate study in biology. The Bachelor of Arts degree provides a choice among several tracks depending upon student interest and/or career plans.

Note: Students should submit their declaration of a biology major early in their college programs. This will permit them to plan their major courses with a department advisor to avoid future conflicts. Transfer students with previous courses in biology, zoology, or botany must have transfer courses evaluated to avoid duplication and possible loss of credit. Decisions regarding UNI major courses and transfer credits should be approved by the department head or advisor.

Academic Standard Policy

Majors

1. Students should indicate their interest in majoring in biology by filling out a Declaration of Curriculum form any time after their admission to UNI.

2. A student’s freshman year shall be devoted primarily to completing the required course work in general biology (BIOL 2051 (840:051) General Biology: Organismal Diversity and BIOL 2052 (840:052) General Biology: Cell Structure and Function) and chemistry (CHEM 1110 (860:044) General Chemistry I and CHEM 1120 (860:048) General Chemistry II, or CHEM 1130 (860:070) General Chemistry I-II). Liberal Arts Core and/or math classes should be taken by students to complete their schedules.

3. For the BS Biology, the BS Environmental Science, the BA Biology, the BA Biology Biomedical Emphasis, the BA Biology-Teaching, and the BA Biology Ecology, Evolution and Organismal Biology emphasis, students must receive a grade of C- (1.67) or higher in courses that are applied to their major. Prior to enrollment in a course, all prerequisites must be completed with a C- (1.67) or higher.

4. ALEKS is a mathematics placement exam used at the University of Northern Iowa. Your academic advisor will use your score on the ALEKS assessment to determine your placement in UNI mathematics, chemistry, and physics courses.

5. If a student drops a course after the first seven days of classes, in the subsequent semester they will only be allowed to register for that course after all advanced registration is completed.

6. To graduate from UNI with a BS Biology, a BA Biology, a BA Biology Biomedical Emphasis, or a BA Biology Ecology, Evolution and Organismal Biology emphasis, students must have both a cumulative and a major UNI GPA of 2.00 or higher, with a grade of C- (1.67) or higher in all courses that are applied to the major. To graduate from UNI with a BA Biology-Teaching, students must have both a cumulative and a major UNI GPA of 2.50 or higher, with a grade of C- (1.67) or higher in all courses that are applied to the major.

7. To graduate from UNI with a biology major, students must take at least four (4) hours of biology at the 4000 level at UNI.

8. Transfer students entering UNI shall be subject to the acceptance requirements listed in #3.

Minors

To graduate from UNI with a biology minor, students must have both a cumulative and a minor UNI GPA of 2.50 or higher, with a grade of C- (1.67) or higher in all courses that are applied to the minor.

Notes:

1. A student can declare only one major within the Department of Biology.

2. A student with a major within Department of Biology cannot declare the B.A. Environmental Resource Management: Ecosystems Track.

3. A student with a major within Department of Biology cannot declare the B.S. Environmental Science: Environmental Life Science Track.

4. A student with a major within the Department of Biology cannot declare a Biology minor or a Biology-Teaching minor.
Bachelor of Science Degree Program

Emphasis-Honors Research

Students invited to do Honors Research will complete 4 credit hours of BIOL 3190 (840:190) Undergraduate Research in Biology and 1 credit hour of BIOL 3191 (840:191) Senior Thesis.

Biology Major

The B.S. Biology major requires a minimum of 126 total hours to graduate. This total includes Liberal Arts Core requirements and the following specified major requirements, plus electives to complete the minimum of 126 hours.

The Bachelor of Science Biology major is designed to prepare students for careers in areas which require a higher degree of concentration in subject matter and cognate areas, particularly advanced-level courses. This degree is especially appropriate for students planning graduate study. In order to ensure graduation within eight semesters, students should work with advisors early in their programs, as advanced planning for sequenced courses is very important.

Course List

Required:

Introductory track:

- BIOL 2051 (840:051) General Biology: Organismal Diversity 15
- BIOL 2052 (840:052) General Biology: Cell Structure and Function
- BIOL 3100 (840:100) Evolution, Ecology and the Nature of Science
- BIOL 3140 (840:140) Genetics

Biology:

- BIOL 3190 (840:190) Undergraduate Research in Biology 5-6
- BIOL 4157/5157 (840:157g) Biostatistics

Cognate courses:

Mathematics:

- MATH 1420 (800:060) Calculus I § 4

Chemistry and Biochemistry:

- CHEM 1110 (860:044) General Chemistry I 16
- CHEM 1120 (860:048) General Chemistry II
- CHEM 2210 (860:120) Organic Chemistry I
- CHEM 2220 (860:123) Organic Chemistry II
- CHEM 2230 (860:121) Organic Chemistry Laboratory
- PHYSICS 1511 (880:054) General Physics I 8

Electives in Biology: ^ † 19-20

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYSICS 1512 (880:056)</td>
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</tr>
<tr>
<td>General Physics II</td>
<td></td>
</tr>
<tr>
<td>MATH 1421 (800:061)</td>
<td></td>
</tr>
<tr>
<td>Calculus II</td>
<td></td>
</tr>
<tr>
<td>CHEM 4510/5510 (860:154g)</td>
<td></td>
</tr>
<tr>
<td>Biochemistry I</td>
<td></td>
</tr>
</tbody>
</table>

Total hours 68

* At least 7-8 hours of BIOL 4xxx (excludes BIOL 4198) is required.

** BIOL 3100 (840:100) Evolution, Ecology and the Nature of Science and BIOL 3140 (840:140) Genetics are not required as prerequisites for 100/3000-level courses.

*** Students with excellent preparation in chemistry may substitute CHEM 1130 (860:070) General Chemistry I-II plus 3 additional credit hours of biology electives for CHEM 1110 (860:044) General Chemistry I and CHEM 1120 (860:048) General Chemistry II.

^ Not more than four (4) semester hours of credit from BIOL 3185 (840:185) Readings in Biology, BIOL 3190 (840:190) Undergraduate Research in Biology and BIOL 4198 (840:198) Independent Study will be accepted for biology elective credit.

† 100/3000-level or above, excluding BIOL 3101 (840:101) Anatomy and Physiology I.

§ Satisfactory score on ALEKS exam or subsequent remediation.

Environmental Science Major

The B.S. Environmental Science program will include two curricular paths for students, one with a life science emphasis and the other with an earth science emphasis. The program will enable students to prepare for a graduate program in the environmental sciences or to directly enter industry in the public or private sector. All students will have a common core of courses providing a foundation in biology and geosciences, and will also be required to take part in a capstone research project.

For students pursuing the B.S. Environmental Science major, the Department of Biology will waive BIOL 2052 (840:052) as a prerequisite for BIOL 3000-level courses.

For students pursuing the B.S. Environmental Science major, the Department of Biology will waive BIOL 3140 (840:140) as a prerequisite for BIOL 4000-level courses.

A student with a major within Department of Biology cannot declare the B.S. Environmental Science: Environmental Life Science Track.

Required Core

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 2051 (840:051)</td>
<td></td>
</tr>
<tr>
<td>General Biology: Organismal</td>
<td></td>
</tr>
<tr>
<td>Diversity</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 3100 (840:100)</td>
<td></td>
</tr>
<tr>
<td>Evolution, Ecology and the</td>
<td></td>
</tr>
<tr>
<td>Nature of Science</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 1110 (860:044)</td>
<td></td>
</tr>
<tr>
<td>General Chemistry I</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 1120 (860:048)</td>
<td></td>
</tr>
<tr>
<td>General Chemistry II</td>
<td>4</td>
</tr>
</tbody>
</table>
Choose one of the following tracks outlined below:  

Environmental Life Sciences Track  

**Total Hours**  

Environmental Earth Science Track  

**Total Hours**  

### Environmental Life Sciences Track  

**Required:** 7  

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 4157/5157</td>
<td>Biostatistics</td>
<td>(840:157g)</td>
</tr>
<tr>
<td>BIOL 4168/5168</td>
<td>Ecology</td>
<td>(840:168g)</td>
</tr>
</tbody>
</table>

**Electives:** 26  

**Total Hours** 65

### Environmental Earth Science Track  

**Required:** 13  

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>EARTHSCI 1400</td>
<td>Introduction to Environmental Earth Science</td>
<td>(870:035)</td>
</tr>
<tr>
<td>EARTHSCI 3230/5230</td>
<td>Air Quality</td>
<td>(870:123g)</td>
</tr>
<tr>
<td>EARTHSCI 3310/5310</td>
<td>Structural Geology</td>
<td>(870:129g)</td>
</tr>
<tr>
<td>EARTHSCI 3325/5325</td>
<td>Sedimentary Geology</td>
<td>(870:136g)</td>
</tr>
<tr>
<td>EARTHSCI 3330/5330</td>
<td>Geomorphology</td>
<td>(870:141g)</td>
</tr>
<tr>
<td>EARTHSCI 3340/5340</td>
<td>Oceanography</td>
<td>(870:165g)</td>
</tr>
<tr>
<td>EARTHSCI 3345/5345</td>
<td>Environmental Geology</td>
<td>(870:171g)</td>
</tr>
<tr>
<td>EARTHSCI 3350/5350</td>
<td>Environmental Hydrology</td>
<td>(870:173g)</td>
</tr>
<tr>
<td>EARTHSCI 3360/5360</td>
<td>Field and Laboratory Methods in Hydrology</td>
<td></td>
</tr>
<tr>
<td>GEOG 2210</td>
<td>Modern Climate Change: Evidence and Predictions</td>
<td>(970:028)</td>
</tr>
<tr>
<td>GEOG 3220</td>
<td>Environmental Geography: Variable Topic</td>
<td>(970:100)</td>
</tr>
<tr>
<td>GEOG 4220/5220</td>
<td>Soils and Landscapes</td>
<td>(970:126g)</td>
</tr>
<tr>
<td>GEOG 4230/5230</td>
<td>Rivers</td>
<td>(970:129g)</td>
</tr>
<tr>
<td>GEOG 4240/5240</td>
<td>The Ice Age</td>
<td>(970:155g)</td>
</tr>
<tr>
<td>GEOG 4320/5320</td>
<td>Geographic Information Systems II</td>
<td>(970:174g)</td>
</tr>
<tr>
<td>GEOG 4370/5370</td>
<td>Remote Sensing of the Environment</td>
<td>(970:173g)</td>
</tr>
<tr>
<td>MATH 1421</td>
<td>Calculus II</td>
<td>(800:061)</td>
</tr>
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</table>

**Electives:** 20  

Pick courses from each of the Categories (A & B) to accumulate a minimum of 20 hours

### Category A - Physical Environment Related Courses (select a minimum of 4 courses)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 3112</td>
<td>Invertebrate Zoology</td>
<td>(840:112)</td>
</tr>
<tr>
<td>BIOL 3120</td>
<td>Plant Diversity and Evolution</td>
<td>(840:120)</td>
</tr>
<tr>
<td>BIOL 3151</td>
<td>General Microbiology</td>
<td>(840:151)</td>
</tr>
<tr>
<td>BIOL 3170</td>
<td>Entomology</td>
<td>(840:170)</td>
</tr>
<tr>
<td>BIOL 4154/5154</td>
<td>Aquatic Ecology</td>
<td>(840:154g)</td>
</tr>
<tr>
<td>BIOL 4164/5164</td>
<td>Mammalogy</td>
<td>(840:164g)</td>
</tr>
<tr>
<td>BIOL 4166/5166</td>
<td>Plant Systematics</td>
<td>(840:166g)</td>
</tr>
<tr>
<td>CHEM 2040</td>
<td>Applied Organic and Biochemistry</td>
<td></td>
</tr>
<tr>
<td>or CHEM 2210</td>
<td>Organic Chemistry I</td>
<td>(860:120)</td>
</tr>
</tbody>
</table>
### Biology Major

The B.A. Biology major requires a minimum of 120 total hours to graduate. This total includes Liberal Arts Core requirements and the following specified major requirements, plus electives to complete the minimum of 120 hours.

This major provides a broad training in biology but allows different specializations through choice of electives. Students who select this major to prepare themselves for graduate study in the biological sciences should consult with their advisor for elective courses. Field courses offered during the summer program at Iowa Lakeside Laboratory may be accepted for biology elective credit.

**Required:**

<table>
<thead>
<tr>
<th>Introductory track:</th>
<th>15</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 2051</td>
<td>General Biology: Organismal Diversity</td>
</tr>
<tr>
<td>BIOL 2052</td>
<td>General Biology: Cell Structure and Function</td>
</tr>
<tr>
<td>BIOL 3100</td>
<td>Evolution, Ecology and the Nature of Science **</td>
</tr>
<tr>
<td>BIOL 3140</td>
<td>Genetics **</td>
</tr>
</tbody>
</table>

**Cognate courses:**

**Mathematics:**

| 4-5 |
Select one of the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 1130</td>
<td>Trigonometry and Mathematics for Biological Sciences</td>
</tr>
<tr>
<td>MATH 1140</td>
<td>Precalculus</td>
</tr>
<tr>
<td>MATH 1420</td>
<td>Calculus I</td>
</tr>
</tbody>
</table>

Chemistry and Biochemistry: *** 12-13

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 1110</td>
<td>General Chemistry I</td>
</tr>
<tr>
<td>CHEM 1120</td>
<td>General Chemistry II</td>
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</table>

Earth Science/Physics (select one of the following): 8

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>EARTHSCI 1300 &amp; EARTHSCI 1320</td>
<td>Introduction to Geology and Earth History</td>
</tr>
<tr>
<td>PHYSICS 1511 &amp; PHYSICS 1512</td>
<td>General Physics I and General Physics II</td>
</tr>
</tbody>
</table>

Electives in Biology: ^ † 17-19

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 2220</td>
<td>Organic Chemistry II</td>
</tr>
<tr>
<td>CHEM 4510/5510</td>
<td>Biochemistry I</td>
</tr>
</tbody>
</table>

Total hours 58

* At least 7-8 hours of BIOL 4xxx (excludes BIOL 4198) is required.

** BIOL 3100 (840:100) Evolution, Ecology and the Nature of Science and BIOL 3140 (840:140) Genetics are not required as prerequisites for 100/3000-level courses.

*** Students with excellent preparation in chemistry may substitute CHEM 1130 (860:070) General Chemistry I-II plus 3 additional credit hours of biology electives for CHEM 1110 (860:044) General Chemistry I and CHEM 1120 (860:048) General Chemistry II.

^ Not more than four (4) semester hours of credit from BIOL 3185 (840:185) Readings in Biology, BIOL 3190 (840:190) Undergraduate Research in Biology and BIOL 4198 (840:198) Independent Study will be accepted for biology elective credit.

† 100/3000-level or above, excluding BIOL 3101 (840:101) Anatomy and Physiology I.

** Biology Major: Biomedical Emphasis **

The B.A. Biology Major: Biomedical Emphasis requires a minimum of 120 total hours to graduate. This total includes Liberal Arts Core requirements and the following specified major requirements, plus electives to complete the minimum of 120 hours.

This major offers basic preparation to students for allopathic, osteopathic, chiropractic, pharmacy, physical therapy, dental, veterinary, optometric, podiatric and other health-related programs. In addition, it prepares students for graduate study in biomedical sciences, e.g., pharmacology, toxicology, pathology, physiology, cellular biology, and related areas. Students should seek advice and information early in their programs so that individual goals and specific additional requirements of some graduate and professional programs can be considered in curricular planning.

** Required:**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 2051</td>
<td>General Biology: Organismal Diversity</td>
</tr>
<tr>
<td>BIOL 2052</td>
<td>General Biology: Cell Structure and Function</td>
</tr>
<tr>
<td>BIOL 3100</td>
<td>Evolution, Ecology and the Nature of Science</td>
</tr>
<tr>
<td>BIOL 3140</td>
<td>Genetics</td>
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Anatomy and Physiology group: 8

<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>BIOL 3101</td>
<td>Anatomy and Physiology I</td>
</tr>
<tr>
<td>or BIOL 3106</td>
<td>Vertebrate Anatomy</td>
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Anatomy and Physiology II 8

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>BIOL 3102</td>
<td>Anatomy and Physiology II</td>
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</table>

Physics: 8

<table>
<thead>
<tr>
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<th>Course Title</th>
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</thead>
<tbody>
<tr>
<td>PHYSICS 1511</td>
<td>General Physics I</td>
</tr>
</tbody>
</table>
Department of Biology

PHYSICS 1512  General Physics II
(880:056)

Electives selected from the following (consult with advisor): 10
BIOL 3106  Vertebrate Anatomy ^
(840:106)
BIOL 3108  Vertebrate Histology
(840:108)
BIOL 3147  Cancer and Emerging Infectious Diseases
(840:147)
BIOL 3151  General Microbiology
(840:151)
BIOL 3190  Undergraduate Research in Biology
(840:190)
BIOL 4114/5114  Comparative Animal Physiology
(840:114g)
BIOL 4116/5116  Neurobiology
(840:116g)
BIOL 4128/5128  Cell Biology
(840:128g)
BIOL 4129/5129  Genomics
(840:129g)
BIOL 4137/5137  Vertebrate Physiology
(840:138g)
BIOL 4144/5144  Virology
(840:144g)
BIOL 4146/5146  Developmental Biology of Animals
(840:146g)
BIOL 4150/5150  Immunology
(840:150g)
BIOL 4157/5157  Biostatistics
(840:157g)
BIOL 4164/5164  Mammalogy
(840:164g)
CHEM 4510/5510  Biochemistry I **
(860:154g)

Total hours  58-62

* At least 7-8 hours of BIOL 4xxx (excludes BIOL 4198) is required.
At least 4 credits of biology electives at the 4000 level need to be taken at UNI.

** For students pursuing graduate programs in allopathic or osteopathic medicine, physician assistant, or veterinary medicine, Biochemistry I (CHEM 4510) and Biochemistry II (CHEM 4520) are recommended and would satisfy a Chemistry minor in addition to the BA Biology Biomedical degree.

^ If not used to satisfy the Anatomy and Physiology group requirement.

Biology Major: Ecology, Evolution and Organismal Biology Emphasis

The B.A. Biology Major: Ecology, Evolution and Organismal Biology Emphasis requires a minimum of 120 total hours to graduate. This total includes Liberal Arts Core requirements and the following specified major requirements, plus electives to complete the minimum of 120 hours.

This emphasis provides training to students interested in organismal and/or ecological biology. With the guidance of a faculty advisor, students who wish to specialize further may follow one of four separate tracks: Ecology, Applied Ecology, Plant Sciences, or Zoology. This emphasis is appropriate for students interested in a career with private and governmental organizations conducting endangered species recovery, ecological restoration, biological surveys, toxicity evaluations, environmental impact analyses, field research, museum or herbarium curation, or who wish to work in zoos, nature centers, museums, or botanical gardens. This emphasis also provides suitable background for students wishing to pursue graduate degrees in animal behavior, botany, conservation biology, ecology, environmental toxicology, evolutionary biology, systematics, population biology, and zoology. Students should seek advice and information early in their programs so that individual goals and specific additional requirements of some graduate and professional programs can be considered in curricular planning. Field courses offered during the summer program at Iowa Lakeside Laboratory may be accepted for biology elective credit.

Required:

Introductory track:  15
BIOL 2051  General Biology: Organismal Diversity
(840:051)
BIOL 2052  General Biology: Cell Structure and Function
(840:052)
BIOL 3100  Evolution, Ecology and the Nature of Science *
(840:100)
BIOL 3140  Genetics **
(840:140)

Cognate courses:
Mathematics:  4-5
Select one of the following:
MATH 1140  Precalculus
(800:046)
MATH 1420  Calculus I
(800:060)
MATH 1130 & MATH 1120  Trigonometry and Mathematics for Biological Sciences
(800:056)

Chemistry and Biochemistry:  12-13
CHEM 1110 & CHEM 1120  General Chemistry I and General Chemistry II ***
(860:044 & 860:048)

Select one of the following:
CHEM 2040  Applied Organic and Biochemistry
CHEM 2210 & CHEM 2230  Organic Chemistry I and Organic Chemistry Laboratory
(860:120 & 860:121)

Physical Science  4
EARTHSCI 1300  Introduction to Geology
(870:031)
Electives: select from the following (consult with advisor):

**Biology:**
- BIOL 3106 (840:106) Vertebrate Anatomy
- BIOL 3107 (840:112) Environmental Physiology
- BIOL 3112 (840:112) Invertebrate Zoology
- BIOL 3118 (840:120) Marine Biology
- BIOL 3120 (840:120) Plant Diversity and Evolution
- BIOL 3160 (840:160) Field Zoology of Vertebrates
- BIOL 3170 (840:170) Entomology
- BIOL 3174 (840:174) Field Biology: __________
- BIOL 3185 (840:185) Readings in Biology
- BIOL 3190 (840:190) Undergraduate Research in Biology
- BIOL 4105/5105 (840:105g) Wildlife Ecology and Management
- BIOL 4108/5108 (840:126g) Biodiversity Conservation Policy
- BIOL 4114/5114 (840:114g) Comparative Animal Physiology
- BIOL 4122/5122 (840:122g) Plant Physiology
- BIOL 4131/5131 (840:131g) Animal Behavior
- BIOL 4137/5137 (840:138g) Vertebrate Physiology
- BIOL 4142/5142 (840:142g) Evolutionary Biology
- BIOL 4146/5146 (840:146g) Developmental Biology of Animals
- BIOL 4154/5154 (840:154g) Aquatic Ecology
- BIOL 4157/5157 (840:157g) Biostatistics
- BIOL 4164/5164 (840:164g) Mammalogy
- BIOL 4166/5166 (840:166g) Plant Systematics
- BIOL 4167/5167 (840:167g) Conservation Biology
- BIOL 4168/5168 (840:168g) Ecology
- BIOL 4180/5180 (840:180g) Restoration Ecology

**Plant group:**
- BIOL 4120 (840:120) Plant Diversity and Evolution

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Earth Science/Geography:

Select one of the following:
- EARTHSCI 3328 (870:125) Fossils and Evolution
- GEOG 3310 (970:164) Geographic Information Systems I
- GEOG 4220/5220 (970:126g) Soils and Landscapes

Total hours: 58

* At least 7-8 hours of BIOL 4xxx (excludes BIOL 4198) is required.
** BIOL 3100 (840:100) Evolution, Ecology and the Nature of Science and BIOL 3140 (840:140) Genetics are not required as prerequisites for 100/3000-level courses.
*** Students with excellent preparation in chemistry may substitute CHEM 1130 (860:070) General Chemistry I-II plus 3 additional credit hours of biology electives for CHEM 1110 (860:044) General Chemistry I and CHEM 1120 (860:048) General Chemistry II.
^ Not more than four (4) semester hours of credit from BIOL 3185 (840:185) Readings in Biology, BIOL 3190 (840:190) Undergraduate Research in Biology and BIOL 4198 (840:198) Independent Study will be accepted for biology elective credit.

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**Biology Major-Teaching (Extended Program)**

The B.A. Biology-Teaching major requires a minimum of 131 total hours to graduate. This total includes Liberal Arts Core requirements, the Professional Education Requirements, and the following specified major requirements to complete the minimum of 131 hours.

The Biology Teaching major provides a broad education in biology. Along with professional education courses and student teaching, this curriculum is a sound preparation for teaching life science, biology, and other secondary science courses. This is an extended program requiring at least nine semesters; therefore, students should contact their advisors early in their program. This program is an excellent preparation for graduate work in biology or science education.

**Required:**

**Introductory track:**
- BIOL 2051 (840:051) General Biology: Organismal Diversity 4
- BIOL 2052 (840:052) General Biology: Cell Structure and Function 4
- BIOL 3100 (840:100) Evolution, Ecology and the Nature of Science 3
- BIOL 3140 (840:140) Genetics 4

**Evolutionary Biology:**
- BIOL 4142/5142 (840:142g) Evolutionary Biology 3

**Plant group:**
- BIOL 3120 (840:120) Plant Diversity and Evolution 4
- Select one of the following:
  - BIOL 3120 (840:120) Plant Diversity and Evolution 4

---

**Department of Biology**
### Department of Biology

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 4122/5122 (840:122g)</td>
<td>Plant Physiology</td>
</tr>
<tr>
<td>BIOL 4166/5166 (840:166g)</td>
<td>Plant Systematics</td>
</tr>
<tr>
<td>BIOL 4172/5172 (840:172g)</td>
<td>Developmental Plant Anatomy</td>
</tr>
</tbody>
</table>

Animal group: 4

Select one of the following:
- BIOL 3102 (840:102) Anatomy and Physiology II **
- BIOL 3106 (840:106) Vertebrate Anatomy
- BIOL 4114/5114 (840:114g) Comparative Animal Physiology
- BIOL 4146/5146 (840:146g) Developmental Biology of Animals

Cellular group: 4

Select one of the following:
- BIOL 3151 (840:151) General Microbiology
- BIOL 4128/5128 (840:128g) Cell Biology

Cognate courses:

- Chemistry and Biochemistry: CHEM 2040 (860:054) Applied Organic and Biochemistry 4
- CHEM 1110 (860:044) General Chemistry I 4
- CHEM 1120 (860:048) General Chemistry II * 4

- Earth Science: EARTHSCI 1320 (870:035) Earth History ^^ 4
- PHYSICS 1511 (880:054) General Physics I 4

- Methods: SCI ED 3300/5300 (820:190g) Orientation to Science Teaching 4
- SCI ED 4800/5800 Methods for Teaching Secondary Science or MTSS (Methods for Teaching Secondary Science) 3

- Teaching: TEACHING 3129 Secondary and Special-Area Classroom Management 1

- Biology: Electives in Biology: † 4

Total Hours 62

* At least 7-8 hours of BIOL 4xxx (excludes BIOL 4198) is required.

** BIOL 3101 (840:101) is a prerequisite for BIOL 3102 (840:102). Students who take BIOL 3101 (840:101) Anatomy and Physiology I will receive university elective credit. BIOL 3102 (840:102) Anatomy and Physiology II will fulfill the Animal Group requirement. BIOL 3102 (840:102) Anatomy and Physiology II cannot count as biology elective credit if used to fulfill the Animal Group requirement.

^ Students with excellent preparation in chemistry may substitute CHEM 1130 (860:070) General Chemistry I-II plus 3 additional credit hours of biology or chemistry electives for CHEM 1110 (860:044) General Chemistry I and CHEM 1120 (860:048) General Chemistry II.

† Not more than four (4) semester hours of credit from BIOL 3185 (840:185) Readings in Biology, BIOL 3190 (840:190) Undergraduate Research in Biology, and BIOL 4198 (840:198) Independent Study will be accepted for biology elective credit.

^^ EARTHSCI 1320 (870:035) has a prerequisite of EARTHSCI 1300 (870:031). This prerequisite is waived for Biology Teaching majors.

### Combined B.A./M.S. or B.S./M.S. Program Biology

The B.A./M.S. or B.S./M.S. degree program is a five-year program offered on the thesis option only, leading to both the B.A./B.S. and M.S. degrees in biology. This program prepares students for doctoral graduate studies in biology and it provides training for work as a biologist in academic, industrial, and government laboratories. Students interested in this program can declare their intent by the end of the junior year, provided they have an overall grade point average (GPA) of 3.00 or above. An Application for Admission to Graduate Study should be completed and the student’s interest in the Combined B.A./M.S. or B.S./M.S. Program in Biology indicated on the application itself. Graduate information and an application for graduate admission can be found at www.grad.uni.edu/admission.

Once admitted to the program, undergraduate students (who are classified as seniors), may register for a maximum of 12 hours of graduate credit as a senior, with the approval of the student’s advisor, the instructor of the course(s), and the head(s) of the department(s) offering the course(s). See policies and procedures for Graduate Credit for Undergraduate Students. Actual admission to graduate study and classification as a graduate student commences the term after the student has completed the baccalaureate.

Refer to the M.S. Biology Major for program requirements.

### Environmental Resource Management Major

The Environmental Resource Management major is aimed at students searching for career options in the broadly-defined 'outdoor environment' that are related to natural resources, environmental systems, and sustainable development. This program will prepare students for careers in the environmental and human management of public and private spaces across differing categories of environmental systems - from public parks and lands to conservancy units managed by governmental and other non-profit agencies and organizations. This program aims to serve those students who do not wish to pursue
careers as environmental scientists *per se* from more tightly focused 'environmental science' programs.

- **STUDENTS ARE REQUIRED TO TAKE THE CORE REQUIREMENTS (31 HOURS) AND MAY CHOOSE ONLY ONE OF THE FOUR SPECIALIZATION TRACKS (30-32 HOURS).**

- Each track is composed of clusters of courses with a specific concentration, each of which has a separate hourly requirement.

- For purposes of this degree program, those prerequisite courses required by BIOL, EARTHSCI, GEOG, and RTNL for mid/upper-level courses in each Track THAT ARE NOT INCLUDED IN THE CORE REQUIREMENTS will normally be waived by the appropriate departments.

- The separate tracks allow students to specialize in the area of most general interest while the primary & secondary foci within each track make sure students also are exposed to a wide range of important auxiliary coursework.

- A student with a major within Department of Biology cannot declare the B.A. Environmental Resource Management: Ecosystems Track.

- By permission of the Provost’s Office, students enrolled in the B.A. Environmental Resource Management major will be considered majors in all four of the participating departments.

### Core Requirements

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
</tr>
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<tbody>
<tr>
<td>BIOL 2051 (840:051)</td>
<td>General Biology: Organismal Diversity</td>
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<tr>
<td>BIOL 3100 (840:100)</td>
<td>Evolution, Ecology and the Nature of Science *</td>
<td>3</td>
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<tr>
<td>CHEM 1110 (860:044)</td>
<td>General Chemistry I</td>
<td>4</td>
</tr>
<tr>
<td>EARTHSCI 1300 (870:031)</td>
<td>Introduction to Geology</td>
<td>4</td>
</tr>
</tbody>
</table>
| or
| GEOG 1210 (970:026) & GEOG 1211 | Physical Geography and Physical Geography Laboratory              | 4     |
| EARTHSCI 3330/5330 (870:141g) | Geomorphology                                      | 4     |
| GEG 4260 | Environmental Resource Management                   | 3     |
| GEG 3310 (970:164) | Geographic Information Systems I                   | 3     |
| RTNL 4320 | Financial Resource Management in Recreation, Tourism and Nonprofit Leadership | 3     |
| HIST 4170/5170 | U.S. Environmental History                         | 3     |

**Total Hours: 31**

* For students pursuing the Environmental Resource Management B.A. degree, the Department of Biology will waive the BIOL 2052 (840:052) and CHEM 1120 (860:048) prerequisites for enrollment into BIOL 3100 (840:100).

**Encouraged Certificates:** Certificate programs that are appropriate to couple with the ERM major and help to expand specific, relevant experiences for students.

- GIS & Cartography (Department of Geography)
- Sustainability (Interdisciplinary)
- Outdoor Recreation (Department of Health, Recreation and Community Services)
- Tourism (Department of Health, Recreation and Community Services)
- Nonprofit Management Certificate (Department of Health, Recreation and Community Services)
- Environmental Health Certificate (Department of Health, Recreation and Community Services)
- Public History (Department of History)

### Ecosystems Track

A total of 32 hours are needed for this track. There are 12 hours of required courses. In addition, student select courses from all three elective categories (A, B, & C) to accumulate to a minimum of 20 hours. At least one course must be taken from each elective category.

**Required**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
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<tbody>
<tr>
<td>BIOL 4168/5168</td>
<td>Ecology **</td>
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<tr>
<td>CHEM 1120 (860:048)</td>
<td>General Chemistry II</td>
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<tr>
<td>MATH 1140 (800:046)</td>
<td>Precalculus</td>
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**Electives:** 20

**Category A - Content Management Related Courses (pick at least 1 course)**

<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td>BIOL 4105/5105 (840:105g)</td>
<td>Wildlife Ecology and Management **</td>
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</tr>
<tr>
<td>BIOL 4108/5108 (840:108g)</td>
<td>Biodiversity Conservation Policy **</td>
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<tr>
<td>BIOL 4167/5167 (840:167g)</td>
<td>Conservation Biology **</td>
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<tr>
<td>BIOL 4180/5180 (840:180g)</td>
<td>Restoration Ecology **</td>
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</table>

**Category B - Content Related Courses (pick at least 1 course)**

<table>
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<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
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<tbody>
<tr>
<td>BIOL 3112 (840:112)</td>
<td>Invertebrate Zoology *</td>
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<tr>
<td>BIOL 3118</td>
<td>Marine Biology *</td>
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<tr>
<td>BIOL 3170 (840:170)</td>
<td>Entomology *</td>
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<tr>
<td>BIOL 4154/5154 (840:154g)</td>
<td>Aquatic Ecology **</td>
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<tr>
<td>BIOL 4157/5157 (840:157g)</td>
<td>Biostatistics **</td>
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<tr>
<td>BIOL 4164/5164 (840:164g)</td>
<td>Mammalogy **</td>
<td></td>
</tr>
<tr>
<td>BIOL 4166/5166 (840:166g)</td>
<td>Plant Systematics **</td>
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</tr>
<tr>
<td>GEOG 4310/5310 (970:170g)</td>
<td>GIS Applications: (Variable Topic)</td>
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</tr>
<tr>
<td>GEOG 4320/5320 (970:174g)</td>
<td>Geographic Information Systems II</td>
<td></td>
</tr>
</tbody>
</table>

**Category C - Cognates (pick at least 1 course)**
**EARTHSCI 1200** (870:021)  
Elements of Weather

**ENGLISH 4785/5785**  
Applied Writing: Projects, Grants and Careers

**GEOG 2210** (970:028)  
Modern Climate Change: Evidence and Predictions

**GEOG 3210** (970:137)  
Natural Hazards and Disasters

**GEOG 3220** (970:100)  
Environmental Geography: Variable Topic

**GEOG 4220/5220** (970:126g)  
Soils and Landscapes

**GEOG 4240/5240** (970:155g)  
The Ice Age

**GEOG 4250/5250** (970:185g)  
Laboratory Methods in Environmental Geography

**GEOG 4270/5270**  
Regional Landforms of North America

**GEOG 3179** (970:179)  
Cooperative Education in Geography

**MGMT 3183**  
Leadership Skills

**RTNL 2120**  
Foundations of Tourism

**RTNL 4553/5553**  
Trends and Issues in Outdoor Recreation

**RTNL/HIST 4556**  
History of Outdoor Recreation

**Total Hours** 32

* For students pursuing the Environmental Resource Management B.A. degree, the Department of Biology will waive BIOL 2052 (840:052) and CHEM 1120 (860:048) for BIOL 3000-level courses.

** For students pursuing the Environmental Resource Management B.A. degree, the Department of Biology will waive BIOL 3140 (840:140) as a prerequisite for BIOL 4000-level courses.

^ These courses have additional prerequisites as follows: ENGLISH 4785/5785 (620:177g) has prerequisites of ENGLISH 2770 (620:077) and one of the following - INSTTECH 4170/5170 (240:170g), ART 3030 (600:125), ENGLISH 4765/5765 (620:102g), ENGLISH 4770/5770 (620:104g), ENGLISH 4775/5775 (620:105g). ENGLISH 4780/5780 (620:107g) or consent of instructor; junior standing. GEOG 3220 (970:100) has a prerequisite of GEOG 1120 (970:010) or GEOG 1210 (970:026) or GEOG 2210 (970:028) or GEOG 1110 (970:040) or consent of instructor. GEOG 4240/5240 (970:155g) has prerequisites of GEOG 1210 (970:026); GEOG 2210 (970:028); EARTHSCI 1300 (870:031); or consent of instructor; junior standing. MGMT 3183 and MGMT 3185 has a prerequisite of MGMT 3153 (150:153). GEOG 3179 (970:179) has prerequisites of 15 hours of geography at UNI; cumulative GPA of 2.50; junior standing; consent of department. RTNL 4320 has prerequisites of three (3) credit hours of RTNL 31XX; junior standing. For students pursuing the Environmental Resource Management major, Department of Health, Recreation and Community Services will waive the prerequisites of 3 hours of RTNL 31XX. RTNL 4510 has prerequisites of senior standing; consent of Internship Coordinator and a corequisite of RTNL 4520. For students pursuing the Environmental Resource Management major, Department of Health, Recreation and Community Services will waive this corequisite. PH 4180 has prerequisites of PH 3170; senior standing; 2.50 cumulative GPA; consent of Division of Health Promotion and Education Coordinator of Student Field Experiences.

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**Geosystems Track**

A total of 30 hours are needed for this track, with a minimum of 21 hours from the Primary Focus group and 9 hours from the Secondary Focus group.

**Electives**

**Primary Focus - Content Related Courses** 21

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>EARTHSCI 1200</td>
<td>Elements of Weather</td>
</tr>
<tr>
<td>(870:021)</td>
<td></td>
</tr>
<tr>
<td>EARTHSCI 3350/535</td>
<td>Environmental Hydrology</td>
</tr>
<tr>
<td>(870:173g)</td>
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<tr>
<td>EARTHSCI 3322</td>
<td>Earth Materials</td>
</tr>
<tr>
<td>(870:173)</td>
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<tr>
<td>GEOG 2210</td>
<td>Modern Climate Change: Evidence and Predictions</td>
</tr>
<tr>
<td>(970:028)</td>
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<tr>
<td>GEOG 3210</td>
<td>Natural Hazards and Disasters</td>
</tr>
<tr>
<td>(970:137)</td>
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</tr>
<tr>
<td>GEOG 3220</td>
<td>Environmental Geography: Variable Topic</td>
</tr>
<tr>
<td>(970:100)</td>
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</tr>
<tr>
<td>or EARTHSCI 3345/534</td>
<td>Environmental Geology</td>
</tr>
<tr>
<td>(870:171g)</td>
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<tr>
<td>GEOG 4220/5220</td>
<td>Soils and Landscapes</td>
</tr>
<tr>
<td>(970:126g)</td>
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</table>
### Secondary Focus - Management Cognates

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 4105/5105</td>
<td>Wildlife Ecology and Management</td>
<td>(840:105g)</td>
</tr>
<tr>
<td>BIOL 4180/5180</td>
<td>Restoration Ecology</td>
<td>(840:180g)</td>
</tr>
<tr>
<td>EARTHSCI 3325/5325</td>
<td>Sedimentary Geology</td>
<td>(870:136g)</td>
</tr>
<tr>
<td>EARTHSCI 3360/5360</td>
<td>Field and Laboratory Methods in Hydrology</td>
<td></td>
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<tr>
<td>ENGLISH 4785/5785</td>
<td>Applied Writing: Projects, Grants and Careers</td>
<td>(620:177g)</td>
</tr>
<tr>
<td>GEOG 4105/5105</td>
<td>Regional Analysis and Planning</td>
<td>(970:168g)</td>
</tr>
<tr>
<td>GEOG 4240/5240</td>
<td>The Ice Age</td>
<td>(970:155g)</td>
</tr>
<tr>
<td>GEOG 4270/5270</td>
<td>Regional Landforms of North America</td>
<td></td>
</tr>
<tr>
<td>GEOG 4310/5310</td>
<td>GIS Applications: (Variable Topic)</td>
<td>(970:170g)</td>
</tr>
<tr>
<td>GEOG 4320/5320</td>
<td>Geographic Information Systems II</td>
<td>(970:174g)</td>
</tr>
<tr>
<td>RTNL 4776/5776</td>
<td>History of Outdoor Recreation</td>
<td></td>
</tr>
<tr>
<td>RTNL/HIST 4556</td>
<td>Eco, Adventure and Sport Tourism</td>
<td></td>
</tr>
<tr>
<td>MGMT 3185</td>
<td>Project Management</td>
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<tr>
<td>POL AMER 3172/5172</td>
<td>Public Budgeting</td>
<td>(942:172)</td>
</tr>
<tr>
<td>BIOL 3179</td>
<td>Cooperative Education</td>
<td>(840:179)</td>
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<td>or GEOG 3179</td>
<td>Cooperative Education in Geography</td>
<td>(970:179)</td>
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<tr>
<td>or EARTHSCI 3430</td>
<td>Internship</td>
<td>(870:195)</td>
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<tr>
<td>or RTNL 4510</td>
<td>Internship in Recreation, Tourism and Nonprofit Leadership</td>
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</tr>
<tr>
<td>or PH 4180</td>
<td>Internship</td>
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</table>

**Total Hours: 30**

* For students pursuing the Geosystems Track, the Geography Department will accept GEOG 1210 (970:026) and GEOG 1211 or EARTHSCI 1300 (870:031) as the prerequisite for enrollment into all listed Geography courses except GEOG 4310/5310 (970:170g) and GEOG 4320/5320 (970:174g).

** The Biology Department will waive BIOL 3140 (840:140) as a prerequisite for BIOL 4105/5105 (840:105g) and BIOL 4180/5180 (840:180g).

*** The Earth and Environmental Sciences Department will accept GEOG 1210 (970:026) and GEOG 1211 as substitutes for courses that require EARTHSCI 1300 (870:031).

**** The Earth and Environmental Sciences Department will waive the requirement of EARTHSCI 1320 (870:035) for EARTHSCI 3325/5325 (870:136g).

# The Department of Health, Recreation and Community Services will waive RTNL 2120 as a prerequisite for RTNL 4776/5776.

* These courses have additional prerequisites as follows:

EARTHSCI 3322 has a prerequisite of EARTHSCI 1300 (870:031).

EARTHSCI 3350/5350 (870:173g) has prerequisites of EARTHSCI 1300 (870:031); junior standing.

GEOG 3220 (970:100) has a prerequisite of GEOG 1120 (970:010) or GEOG 1210 (970:026) or GEOG 2210 (970:028) or GEOG 1110 (970:040) or consent of instructor.

ECON 3225/5225 (920:123g) has prerequisites of ECON 1041 (920:053), ECON 1051 (920:054); junior standing.

ENGLISH 4785/5785 (620:177g) has prerequisites of ENGLISH 2770 (620:077); one of the following courses - INSTTECH 4170/5170 (240:170g), ART 3030 (600:125), ENGLISH 4765/5765 (620:102g), ENGLISH 4770/5770 (620:104g), ENGLISH 4775/5775 (620:105g).

ENGLISH 4780/5780 (620:105g) has prerequisites of ECON 1041 (920:053), ECON 1051 (920:054); junior standing.

MGMT 3185 has a prerequisite of MGMT 3153 (150:153).

POL AMER 3172/5172 has prerequisites of POL AMER 3104 (942:014); POL AMER 1048 (942:048).

GEOG 3179 (970:179) has prerequisites of 15 hours of geography at UNI; cumulative GPA of 2.50; junior standing; consent of department.

RTNL 4510 has prerequisites of senior standing; consent of Internship Coordinator and corequisite of RTNL 4520. For students pursuing the Environmental Resource Management major, the Department of Health Recreation and Community Services will waive this corequisite.

PH 4180 has prerequisites of PH 3170; senior standing; 2.50 cumulative GPA; consent of Division of Health Promotion and Education Coordinator of Student Field Experiences.
Resource Administration Track

A total of 30 hours are needed for this track, with a minimum of 21 hours from the Primary Focus group and 9 hours from the Secondary Focus group.

Primary Focus - Content Related Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Prerequisites</th>
</tr>
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<tbody>
<tr>
<td>GEOG 2210</td>
<td>Modern Climate Change: Evidence and Predictions</td>
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</tr>
<tr>
<td>GEOG 4170/5170</td>
<td>Regional Analysis and Planning</td>
<td></td>
</tr>
<tr>
<td>GEOG 3210</td>
<td>Natural Hazards and Disasters</td>
<td></td>
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<tr>
<td>PH 3720/5720</td>
<td>Environmental and Occupational Health Regulations</td>
<td></td>
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</tbody>
</table>

RTNL 2130 Foundation of the Nonprofit Sector

RTNL 3337 Human Resource Development for Recreation, Tourism and Nonprofit Leadership

RTNL 4310/5310 Areas and Facilities in Recreation, Tourism and Nonprofit Leadership

RTNL 4554/5554 Managing Recreation Impacts on the Natural Environment

RTNL/HIST 4556 History of Outdoor Recreation

RTNL 4776/5776 Eco, Adventure and Sport Tourism

Secondary Focus - Cognates

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>BIOL 4167/5167</td>
<td>Conservation Biology **</td>
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<tr>
<td>GEOG 4220/5220</td>
<td>Soils and Landscapes</td>
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<tr>
<td>GEOG 4230/5230</td>
<td>Rivers</td>
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<td>GEOG 4250/5250</td>
<td>Laboratory Methods in Environmental Geography</td>
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<td>GEOG 4270/5270</td>
<td>Regional Landforms of North America</td>
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<tr>
<td>GEOG 4310/5310</td>
<td>GIS Applications: (Variable Topic)</td>
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<td>GEOG 4320/5320</td>
<td>Geographic Information Systems II</td>
</tr>
<tr>
<td>GEOG 4370/5370</td>
<td>Remote Sensing of the Environment</td>
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<tr>
<td>ENGLISH 4775/5775</td>
<td>Applied Writing: Specialized Documents</td>
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<tr>
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<td>Applied Writing: Projects, Grants and Careers</td>
</tr>
<tr>
<td>PH 3710/5710</td>
<td>Environmental Health Science</td>
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<tr>
<td>RTNL 2120</td>
<td>Foundations of Tourism</td>
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<tr>
<td>RTNL 4552/5552</td>
<td>Theory and Practice of Outdoor Education</td>
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<tr>
<td>RTNL 4553/5553</td>
<td>Trends and Issues in Outdoor Recreation</td>
</tr>
<tr>
<td>RTNL 4779/5779</td>
<td>Community Planning Workshop</td>
</tr>
</tbody>
</table>

Department of Biology

Total Hours 30

* The Biology Department will waive BIOL 3140 (840:140) as a prerequisite for BIOL 4167/5167 (840:167g).

** The Geography Department and the Department of Health, Recreation and Community Services will waive RTNL 2120 as a prerequisite for enrollment into RTNL 4310/5310.

^ These courses have additional prerequisites as follows:

RTNL 4776/5776 has prerequisites of RTNL 2120 or consent of instructor; junior standing.

ENGLISH 4775/5775 has prerequisites of MGMT 2080 (150:080) or ENGLISH 2770 (620:077) or consent of instructor; junior standing.

ENGLISH 4778/5785 has prerequisites of ENGLISH 2770 (620:077); one of the following courses - INSTTECH 4170/5170 (240:170g), ART 3030 (600:125), ENGLISH 4765/5765 (620:102g), ENGLISH 4770/5770 (620:104g), ENGLISH 4775/5775 (620:105g), ENGLISH 4780/5780 (620:107g), or consent of instructor; junior standing.

MGMT 3185 has prerequisites of MGMT 3153 (150:153), POL AMER 3172/5172 (942:172) has prerequisites of POL AMER 1014 (942:014); POL AMER 1048 (942:048).

GEOG 3179 (970:179) has prerequisites of 15 hours of geography at UNI; cumulative GPA of 2.50; junior standing; consent of department.

RTNL 4510 has prerequisites of senior standing; consent of Internship Coordinator and a corequisite of RTNL 4520.

MGMT 3185 has a prerequisite of MGMT 3153 (150:153).

POL AMER 3172/5172 (942:172) has prerequisites of POL AMER 1014 (942:014); POL AMER 1048 (942:048).

GEOG 3179 (970:179) has prerequisites of 15 hours of geography at UNI; cumulative GPA of 2.50; junior standing; consent of department.

RTNL 4510 has prerequisites of senior standing; consent of Internship Coordinator and a corequisite of RTNL 4520.

For students pursuing the Environmental Resource Management major, the Department of Health, Recreation and Community Services will waive this corequisite.

PH 4180 has prerequisites of PH 3170; senior standing; 2.50 cumulative GPA; consent of Division of Health Promotion and Education Coordinator of Student Field Experiences.

Environmental Compliance Track

A total of 32 hours need for this focus area, with 15 hours of required courses, a minimum of 10 hours from the Primary Focus group and 7 hours from the Secondary Focus group.

Required

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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</thead>
<tbody>
<tr>
<td>ECON 1041</td>
<td>Principles of Macroeconomics</td>
</tr>
<tr>
<td>MGMT 3185</td>
<td>Project Management</td>
</tr>
<tr>
<td>POL AMER 3172/5172</td>
<td>Public Budgeting</td>
</tr>
<tr>
<td>GEOG 3179</td>
<td>Cooperative Education in Geography</td>
</tr>
<tr>
<td>or BIOL 3179</td>
<td>Cooperative Education</td>
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<tr>
<td>or EARTHSCI 343</td>
<td>Internship</td>
</tr>
<tr>
<td>or RTNL 4510</td>
<td>Internship in Recreation, Tourism and Nonprofit Leadership</td>
</tr>
<tr>
<td>or PH 4180</td>
<td>Internship</td>
</tr>
<tr>
<td>Total Hours</td>
<td>30</td>
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</tbody>
</table>
ECON 1051 (920:054) Principles of Microeconomics 3
ECON 3225/5225 Environmental Economics 3
PH 3720/5720 Environmental and Occupational Health Regulations 3
PHIL 2550 Environmental Ethics 3

Primary Focus - Content Related Courses 10
EARTHSCI 1200 (870:021) Elements of Weather
EARTHSCI 1400 Introduction to Environmental Earth Science
EARTHSCI 3230/5230 Air Quality
EARTHSCI 3345/534 Environmental Geology
EARTHSCI 3350/535 Environmental Hydrology
or GEOG 3220 Environmental Geography: Variable Topic

Secondary Focus - Cognates 7
EARTHSCI 3240/524 Air Quality Modeling
EARTHSCI 3250/525 Measurement and Analysis of Air Quality
EARTHSCI 3325/532 Sedimentary Geology
EARTHSCI 3355/535 Hydrogeology
GEOG 4220/5220 Soils and Landscapes
GEOG 4230/5230 Rivers
GEOG 4370/5370 Remote Sensing of the Environment
PH 3710/5710 Environmental Health Science
RTNL 4554/5554 Managing Recreation Impacts on the Natural Environment
MGMT 3153 Organizational Management
MGMT 3185 Project Management
POL AMER 1048 Current and Emerging Issues in Public Administration
GEOG 3179 Cooperative Education in Geography
or BIOL 3179 Cooperative Education
or EARTHSCI 343 Internship
or RTNL 4510 Internship in Recreation, Tourism and Nonprofit Leadership
or PH 4180 Internship

Other courses as approved by advisors and program director

Total Hours 32
* The Earth and Environmental Sciences Department will accept GEOG 1210 (970:026) and GEOG 1211 as a substitute for courses that require EARTHSCI 1300 (870:031).
** The Earth and Environmental Sciences Department will waive EARTHSCI 3230/5230 (870:123g) as a prerequisite for enrollment into EARTHSCI 3250/5250 (870:177g).
*** The Earth and Environmental Sciences Department will waive the requirement for EARTHSCI 1320 (870:035) for EARTHSCI 3325/5325 (870:136g).
^ These courses have additional prerequisites as follows: GEOG 3220 (970:100) has a prerequisite of GEOG 1120 (970:010) or GEOG 1210 (970:026) or GEOG 2210 (970:028) or GEOG 1110 (970:040) or consent of instructor.

PH 3170 has prerequisites of senior standing; 2.50 cumulative GPA; consent of Division of Health Promotion and Education Coordinator of Student Field Experiences.

Minors

Biology Minor

Required:
Introduction track: 8
BIOL 2051 General Biology: Organismal (840:051)
BIOL 2052 General Biology: Cell Structure and Function (840:052)
Chemistry and Biochemistry: 8
CHEM 1110 General Chemistry I (860:044)
& CHEM 1120 General Chemistry II (860:048)
Electives in Biology: 10-12

Total Hours 26-28
Department of Biology

* Students with excellent preparation in chemistry may substitute CHEM 1130 (860:070) General Chemistry I-II plus 3 additional credit hours of biology electives for CHEM 1110 (860:044) General Chemistry I and CHEM 1120 (860:048) General Chemistry II.


Biology Minor-Teaching

The Biology Minor-Teaching provides for second endorsement approval by the Iowa Board of Educational Examiners and requires first endorsement approval (major) in another science discipline or general science.

Required:

Introductory track:

- BIOL 2051 (840:051) General Biology: Organismal Diversity 4
- BIOL 2052 (840:052) General Biology: Cell Structure and Function 4
- BIOL 3100 (840:100) Evolution, Ecology and the Nature of Science* 3
- BIOL 3140 (840:140) Genetics* 4

Chemistry and Biochemistry:

- CHEM 1110 (860:044) & CHEM 1120 (860:048) and General Chemistry I and General Chemistry II** 8

Methods:

Science and Science Education:

- SCI ED 3300/5300 (820:190g) Orientation to Science Teaching 4
- SCI ED 4800/5800 Methods for Teaching Secondary Science or MTSS (Methods for Teaching Secondary Science) 3

Teaching:

- TEACHING 3129 Secondary and Special-Area Classroom Management 1

Total Hours 31

* 100g/5000-level or above, excluding BIOL 6299 (840:299) Research.

Biology Courses

BIOL 1012 (840:012), Life: The Natural World — 3 hrs.
Examines living organisms with an emphasis on how the natural world functions as a system and how plants and animals, including humans, interact. Declared biology majors cannot receive either university or elective credit for this course. Prerequisite(s): student must have satisfied university entrance requirements in English and Mathematics. (Fall and Spring)

BIOL 1013 (840:013), Life: The Natural World - Lab — 1 hr.
Activities illustrating the importance, origins, and maintenance of biodiversity with a focus on the interactions among organisms and between organisms and the environment. Declared biology majors cannot receive either university or elective credit for this course. Prerequisite(s): student must have satisfied university entrance requirements in English and Mathematics. Prerequisite(s) or corequisite(s): BIOL 1012 (840:012). (Fall and Spring)
Introduction to contemporary topics in biology. Emphasis on study of gene structure and function and applications of biology to human concerns. Declared biology majors cannot receive either university or elective credit for this course. Prerequisite(s): student must have satisfied university entrance requirements in English and Mathematics. (Fall and Spring)

Process of science and application of biology to human concerns stressed through student activities involving basic life science concepts encompassing cell structure and function, human genetics, and disease transmission. Emphasis on assisting students in understanding role of biology in our present society. Lab, 2 periods. Declared biology majors cannot receive either university or elective credit for this course. Prerequisite(s): student must have satisfied university entrance requirements in English and Mathematics. Prerequisite(s) or corequisite(s): Biol 1014 (840:014) or equivalent. (Fall and Spring)

Basic concepts and practical applications of microbiology in daily life; health and disease including basic aspects of immunology and host-microbe interactions. Designed for students majoring in areas other than the sciences. For biology majors and minors counts only for university elective credit. Sections may be offered exclusively for nurses in training. Discussion, 3 periods; lab, 2 periods. (Fall)

Study of organismic biology emphasizing evolutionary patterns and diversity of organisms and interdependency of structure and function in living systems. Discussion, 3 periods; lab, 2 periods. Prerequisite(s): Biol 2051 (840:051) and Biol 2052 (840:052) cannot be taken concurrently. (Fall and Spring)

Introduction to the properties and functions of biological molecules, organization of living cells, production and utilization of energy, and development of multicellular organisms. Discussion, 3 periods; lab, 2 periods. Prerequisite(s): Biol 2051 (840:051) and Biol 2052 (840:052) cannot be taken concurrently. (Fall and Spring)

Unifying principles of biology: how organisms interact with each other and the environment, the genetic continuity of life, and how past history affects life. Readings and student-led discussions explore concepts in detail. Prerequisite(s): Biol 2051 (840:051); Biol 2052 (840:052); Chem 1110 (860:044) and Chem 1120 (860:048), or Chem 1130 (860:070). Biol 3100 (840:100) and Biol 3140 (840:140) cannot be taken concurrently. (Fall and Spring)

Structure and function of organ systems of human body. For students in allied health fields or other university-approved programs. Others must have consent of department head. For Biology majors and minors, counts only for university elective credit. Prerequisite(s): Biol 2051 (840:051); Biol 2052 (840:052); Chem 1110 (860:044) and Chem 1120 (860:048), or Chem 1130 (860:070), or consent of department head. (Fall, Spring, Summer)

Continuation of Biol 3101 (840:101). For students in allied health fields or other university-approved programs. Discussion, 3 periods; lab, 2 periods. Prerequisite(s): C- or better in Biol 3101 (840:101) or Biol 3106 (840:106). (Fall, Spring, Summer)

Consideration of the origin and evolution of vertebrates and comparison of vertebrate structure and function. Discussion, 2 periods; lab, 4 periods. Prerequisite(s): Biol 2051 (840:051); Biol 2052 (840:052); Chem 1110 (860:044) and Chem 1120 (860:048), or Chem 1130 (860:070). (Spring)

Biol 3107. Environmental Physiology — 3 hrs.
Introduction to how animals physiologically adapt to the various unique environmental conditions in which they live. Lecture, 3 hours. Prerequisite(s): Biol 2051 (840:051); Biol 2052 (840:052); Chem 1110 (860:044) and Chem 1120 (860:048), or Chem 1130 (860:070). (Variable)

Microscopic study of cells and tissues from various vertebrate organ systems. Integration of gross anatomy and physiology through illustrating how microscopic ultrastructure is related to organ function. Discussion, 2 periods; lab, 4 periods. Prerequisite(s): Biol 2051 (840:051); Biol 2052 (840:052); Chem 1110 (860:044) and Chem 1120 (860:048), or Chem 1130 (860:070). (Variable)

Morphology, physiology, phylogeny, taxonomy, and ecology of the invertebrates. Discussion, 2 periods; lab, 4 periods. Prerequisite(s): Biol 2051 (840:051); Biol 2052 (840:052); Chem 1110 (860:044) and Chem 1120 (860:048), or Chem 1130 (860:070). (Variable)

Study of the diversity of life in the ocean, including marine ecology, physiology, and current issues in oceanography. Discussion, 3 periods. Prerequisite(s): Biol 2051 (840:051); Biol 2052 (840:052); Chem 1110 (860:044) and Chem 1120 (860:048), or Chem 1130 (860:070). (Variable)

Form and function in vegetative and reproductive organs in all plant divisions, from algae to flowering plants, and their importance in evolutionary thought and plant classification. Lecture, 3 periods; lab, 2 periods. Prerequisite(s): Biol 2051 (840:051); Biol 2052 (840:052); Chem 1110 (860:044) and Chem 1120 (860:048), or Chem 1130 (860:070). (Spring)

Biol 3140 (840:140). Genetics — 4 hrs.
Analytical approach to classical, molecular, and population genetics. Discussion, 3 periods; lab, 2 periods. Prerequisite(s): Biol 2051 (840:051); Biol 2052 (840:052); Chem 1110 (860:044) and Chem 1120 (860:048), or Chem 1130 (860:070). (Spring)

Cellular and molecular study of cancer, its epidemiology, standard and novel cancer treatments, examination of emerging and re-emerging infectious diseases, their causative organisms, and human immune responses to them. Discussion, 3 periods. Prerequisite(s): Biol 2051 (840:051); Biol 2052 (840:052); Chem 1110 (860:044) and Chem 1120 (860:048), or Chem 1130 (860:070). Biol 3100 (840:100) and Biol 3140 (840:140) cannot be taken concurrently. (Fall and Spring)

Physiology, morphology, taxonomy, immunology, and pathogenicity of microbes, with applications to medicine, agriculture, sanitation, and industry. Discussion, 2 periods; lab, 4 periods. Prerequisite(s):
BIOL 2051 (840:051); BIOL 2052 (840:052); CHEM 1110 (860:044) and CHEM 1120 (860:048), or CHEM 1130 (860:070). (Fall and Spring)

BIOL 3160 (840:160). Field Zoology of Vertebrates — 4 hrs. Identification and natural history of Iowa vertebrates. Emphasis on field trips. Discussion, 2 periods; lab and field work, 6 periods. Prerequisite(s): BIOL 2051 (840:051); BIOL 2052 (840:052); CHEM 1110 (860:044) and CHEM 1120 (860:048), or CHEM 1130 (860:070). (Spring)

BIOL 3170 (840:170). Entomology — 3 hrs. Introduction to biology of insects. Discussion, 2 periods; lab, 2 periods. Prerequisite(s): BIOL 2051 (840:051); BIOL 2052 (840:052); CHEM 1110 (860:044) and CHEM 1120 (860:048), or CHEM 1130 (860:070). (Variable)

BIOL 3174 (840:174). Field Biology: __________ — 1-3 hrs. Selected topics in field biology, emphasizing hands-on techniques for field observation, and testing of evolutionary and ecological hypotheses. Offered both on- and off-campus in flexible format. Topics and hours listed in Schedule of Classes. May be repeated for credit on different topic. Prerequisite(s): vary with topic. (Variable)

BIOL 3179 (840:179). Cooperative Education — 1-6 hrs. Up to 12 hours of ungraded credit (credit/no credit basis) may be taken as university electives. (Fall, Spring, Summer)

BIOL 3181 (840:181). Investigations in Life Science — 4 hrs. Introduction to significant life science concepts and models of effective teaching related to elementary school life science. Topics include cellular structure and function, inheritance, plant systems, and human systems. Discussion and/or lab, 5 periods. Prerequisite(s): SCI ED 1200 (820:032). (Odd Falls)

BIOL 3185 (840:185). Readings in Biology — 1-3 hrs. Independent readings in biology from selected list approved in advance. Maximum of 3 hours for biology major or minor. Prerequisite(s): consent of department. (Fall, Spring, Summer)

BIOL 3189 (840:189). Seminar — 1-2 hrs. (Variable)

BIOL 3190 (840:190). Undergraduate Research in Biology — 1-3 hrs. Research activities under direct supervision of Biology faculty members. Credit determined prior to registration based upon student proposal with agreement of faculty advisor. May be repeated for maximum of 4 hours. Prerequisite(s): BIOL 2051 (840:051); BIOL 2052 (840:052); sophomore standing; consent of department. (Fall, Spring, Summer)

BIOL 3191 (840:191). Senior Thesis — 1 hr. Senior research thesis. Open only to and required for students pursuing the B.S. Biology or B.A. Biology Honors Emphasis. Prerequisite(s): consent of department head. (Fall, Spring, Summer)

BIOL 4105/5105 (840:105g). Wildlife Ecology and Management — 4 hrs. Applied population management of game and nongame wildlife. Lab emphasizes field techniques, population modeling, and habitat management planning. Discussion, 3 periods; lab, 3 periods. Prerequisite(s): BIOL 3100 (840:100); BIOL 3140 (840:140); junior standing. (Odd Falls)

BIOL 4108/5108. Biodiversity Conservation Policy — 3 hrs. Review of laws and policies affecting endangered species, ecosystem management, and biodiversity conservation in the United States. Discussion, 3 periods; lab, 2 periods. Prerequisite(s): BIOL 3100 (840:100); BIOL 3140 (840:140); junior standing. (Even Springs)

BIOL 4114/5114 (840:114g). Comparative Animal Physiology — 4 hrs. Physical and chemical basis of cellular/organ functions across various animal phyla. Discussion, 3 periods; lab, 3 periods. Prerequisite(s): BIOL 3100 (840:100); BIOL 3140 (840:140); CHEM 2204 or CHEM 2210 (860:120); junior standing. (Even Falls)

BIOL 4116/5116 (840:116g). Neurobiology — 3 hrs. Survey of vertebrate nervous systems. Examination of several levels of organization ranging from molecules to neurons to larger systems in the brain. Discussion, 3 periods. Prerequisite(s): BIOL 3100 (840:100); BIOL 3140 (840:140); CHEM 2204 or CHEM 2210 (860:120); junior standing. (Spring)

BIOL 4121/5121 (840:121g). Plant Biotechnology — 4 hrs. Highlights the theory and applications of plant tissue cultures, genetic engineering (including use of plants for production of antibodies and vaccines), marker-assisted selection, and genomics. Lab component gives students practical experience with the biotechnology applications discussed in lecture. Discussion, 2 periods; lab, 4 periods. Prerequisite(s): BIOL 3100 (840:100); BIOL 3140 (840:140); junior standing. (Odd Falls)

BIOL 4122/5122 (840:122g). Plant Physiology — 4 hrs. How plants work: uptake and use of water and materials, synthesis and transport of organic compounds, growth and development, and responses to environment. Lecture, 3 periods; lab, 3 periods. Prerequisite(s): BIOL 3100 (840:100); BIOL 3140 (840:140); CHEM 2204 or CHEM 2210 (860:120); junior standing. (Variable)

BIOL 4127/5127 (840:127g). Bioinformatics Applications for Biology — 3 hrs. Introduction to computer based analyses and management applications for molecular biological data. Topics include bioinformatics history, instrumentation, PC applications, resources, data bases, and discussions of genomics and proteomics applications. Discussion, 3 periods. Prerequisite(s): BIOL 3100 (840:100); BIOL 3140 (840:140); junior standing. (Variable)

BIOL 4128/5128 (840:128g). Cell Biology — 4 hrs. Foundation in cell structure, organization, and function, with emphasis on signal transduction, cell trafficking and cell cycle control. Lab will emphasize developing laboratory skills and improving analytical and writing abilities. Discussion, 3 periods; lab, 3 periods. Prerequisite(s): BIOL 3100 (840:100); BIOL 3140 (840:140); CHEM 2204 or CHEM 2210 (860:120); junior standing. (Spring)

BIOL 4129/5129 (840:129g). Genomics — 3 hrs. Genome sequencing, analysis of sequence variation, sequencing for disease diagnosis, comparative genomics, personal genomics, the epigenome in disease development, analysis of gene expression. Discussion, 2 periods; lab, 2 periods. Prerequisite(s): BIOL 3100 (840:100); BIOL 3140 (840:140); junior standing. (Even Falls)

BIOL 4137/5137 (840:138g). Vertebrate Physiology — 4 hrs. Study of functional mechanisms for cellular processes in select vertebrate organ systems. Discussion, 3 periods; lab, 3 periods. Prerequisite(s): BIOL 3100 (840:100); BIOL 3140 (840:140); CHEM 2204 or CHEM 2210 (860:120); junior standing. (Odd Falls)

BIOL 4142/5142 (840:142g). Evolutionary Biology — 3 hrs. Conceptual overview of evolutionary theory, mechanisms of evolutionary process, speciation and major evolutionary events.
Introduction to virus structure, replication, genetics, pathogenicity, host interactions, detection, epidemiology, evolution, and virology methods. Health, agriculture, research and industry applications. Discussion, 3 periods; lab, 2 periods. Prerequisite(s): BIOL 3100 (840:100); BIOL 3140 (840:140); junior standing. (Spring)

**BIOL 4144/5144 (840:144g). Virology — 4 hrs.**
Introduction to virus structure, replication, genetics, pathogenicity, host interactions, detection, epidemiology, evolution, and virology methods. Health, agriculture, research and industry applications. Discussion, 3 periods; lab, 2 periods. Prerequisite(s): BIOL 3100 (840:100); BIOL 3140 (840:140); junior standing. (Spring)

**BIOL 4180/5180 (840:180g). Restoration Ecology — 4 hrs.**
Ecological principles applied to restoration of degraded ecosystems. Lab covers hands-on techniques in regional restoration and reconstruction. Discussion, 3 periods; lab, 3 periods. Prerequisite(s): BIOL 3100 (840:100); BIOL 3140 (840:140); junior standing. (Odd Springs)

**BIOL 4198 (840:198). Independent Study — 1-6 hrs.**
(Fall, Spring, Summer)

**BIOL 6202 (840:202). Graduate Colloquium and Scientific Skills — 2 hrs.**
Regular presentations by students, faculty members, or visitors on biological topics combined with instructional guidance to build scientific literacy, writing, and statistical skills. Taken each semester for four semesters for maximum of 8 hours. Discussion, 2 periods. (Fall and Spring)

**BIOL 6230 (840:230). Special Problems in Biology — 1-6 hrs.**
Credit determined at registration. (Problems in biology other than those for theses or in regular curricular offerings.) May be repeated. Prerequisite(s): BIOL 6292 (840:292) recommended; consent of department. (Fall, Spring, Summer)

**BIOL 6240 (840:240). Advanced Cellular and Molecular Biology — 3 hrs.**
Selected topics concerning understanding of function of living organisms at molecular and cellular level: regulatory mechanisms, recombinant DNA techniques, gene expression, and genetics of diseases. Lecture/discussion, 3 periods. May be repeated on different topic. Prerequisite(s): consent of instructor. (Odd Springs)

**BIOL 6250 (840:250). Advanced Physiology and Development — 3 hrs.**
Selected topics concerning understanding of function of living organisms at molecular and cellular level: regulatory mechanisms, recombinant DNA techniques, gene expression, and genetics of diseases. Lecture/discussion, 3 periods. May be repeated on different topic. Prerequisite(s): consent of instructor. (Odd Springs)

**BIOL 6260 (840:260). Advanced Ecology — 3 hrs.**
Selected topics of ecology, concerning the understanding of relationships among organisms, and between organisms and their environments (natural or artificial): physiological ecology, conservation biology, and aquatic ecology. Lecture/discussion, 3 periods. May be repeated on different topic. Prerequisite(s): consent of instructor. (Even Springs)

**BIOL 6270 (840:270). Advanced Systematics and Evolutionary Biology — 3 hrs.**
Selected topics concerning understanding of systematic and evolutionary relationships among organisms and evolutionary biology: evolutionary theory, systematics, and origin of life. Lecture/discussion, 3 periods. May be repeated on different topic. Prerequisite(s): consent of instructor. (Even Falls)

**BIOL 6289 (840:289). Seminar — 1 hr.**
May be repeated for credit. (Variable)

**BIOL 6292 (840:292). Research Methods in Biology — 1 hr.**
Introduction to research methods in biology. Emphasis on literature review, proposal preparation, and manuscript style. Discussion, 1 period. (Fall and Spring)

**BIOL 6297 (840:297). Practicum — 2 hrs.**
May be repeated. (Variable)
Department of Biology

BIOL 6299 (840:299). Research. 
Prerequisite(s): consent of department. (Fall, Spring, Summer)

(Fall, Spring, Summer)

Iowa Lakeside Laboratory Courses

Introduction to the essentials of earth science (astronomy, meteorology, geology, and paleontology). (Summer)

Role of soils in the environment; relationship between soil quality and plant growth. Field studies on soil identification, degradation and restoration as well as identifying tools useful in effective land and water stewardship. (Summer)

Offered as demand warrants. Five day-long, non-technical introductions to a specific aspect of the natural history of the upper Midwest or techniques for studying natural history. Prerequisite: junior standing. (Variable)

A. Amphibians and Reptiles
B. Birds and Birding
C. Nature Photography
D. Mushrooms and Other Fungi
E. Iowa’s Trees and Forests
F. Fish Biology
G. Prairies
I. Common Insects
J. Aquatic Plants
K. Life in Rivers
L. Life in Lakes
M. Mosses and Liverworts
N. Natural History of Iowa Great Lakes Region
P. Field Archaeology
Q. Common Algae
S. Scuba Diving
T. Astronomy
U. Sketching Nature (Variable)

Introduction to the evolutionary and basic principles of ecology at the organismal, population, community, and ecosystem levels. Integrates lectures and field studies to examine the distribution and abundance of plans and animals in native ecosystems. (Summer)

IA LL 2034. Topics in Ecology and Sustainability — 1-4 hrs. 
Scientific introduction to ecology and evolution of important groups of organisms. Topics include: algae to vertebrates, different ecological phenomena (e.g., fire and climate change), varying landforms, different ecosystems (e.g., prairies and aquatic systems); emphasis on sustainability with introduction to concepts, issues, and practices; ability to communicate environmental information through a variety of means. May be repeated. (Summer)

IA LL 2040 (890:040). Field Archaeology — 4 hrs. 
Nature of cultural and environmental evidence in archaeology and how they are used to model past human behavior and land use; emphasis on Iowa prehistory; basic reconnaissance surveying and excavation techniques. (Summer)

Sketching plants, animals, and terrain. Visual communication, development of a personal style, and integration of typographic and visual elements on a page will be emphasized. (Summer)

Beginning to intermediate technical and compositional aspects of color photography of natural areas and their plants and animals. (Summer)

IA LL 2045 (890:050). Undergraduate Internships — 1-5 hrs. 
Placement with county conservation boards, camps, parks, etc., for experience as interpreters, rangers, and technicians. (Summer)

IA LL 3100/5100 (890:100g). Techniques For Biology Teaching — 1-2 hrs. 

Development and implementation of laboratory exercises suitable for inclusion in elementary, middle, high school, and community college biology and environmental courses. Exercises will be built around common organisms and ecosystems in Iowa. Field trips. A. (Summer)

Introduction to ecology and co-evolution of plants and animals. Emphasis on dispersal, pollination, and plant-herbivore interactions; field and laboratory work, reading, and discussion. Prerequisite(s): one course in the biological sciences; junior standing. (Variable)

IA LL 3103/5103 (890:103g). Aquatic Ecology — 4 hrs. 
Analysis of aquatic ecosystems. Emphasis on basic ecological principles; ecological theories tested in the field, and identification of common plants and animals. Prerequisite(s): courses in ecology, chemistry, and physics or consent of instructor; junior standing. (Summer)

IA LL 3105/5105 (890:105g). Plant Taxonomy — 4 hrs. 
Principles of classification and evolution of vascular plants; taxonomic tools and collection techniques; use of keys. Field and laboratory studies emphasizing identification of local flowering plants and recognition of major plant families. Prerequisite(s): two semesters of introductory biology or consent of instructor; junior standing. (Summer)

IA LL 3107/5107. Field Parasitology — 4 hrs. 
Ecology and life history of parasites, protozoans, helminths, arthropods; field and laboratory investigations including preparation, identification, and morphology of representative types and stages; general and comparative concepts of parasitology. (Variable)

Structure and taxonomy of freshwater algae based on field-collected material. Emphasis on genus-level identifications, habitats; visited locations include lakes, fens, streams, and rivers; algal ecology. (Summer)

IA LL 3111/5111 (890:111g). Summer Writing Festival at Iowa Lakeside Laboratory — 1 hr. 
One-week workshop designed for young adult to adult writers of all levels, helps participants apply their imagination to their life experiences and become more effective writers. Writing exercises invite imaginative leaps and thoughtful reflections and humor, as well as seriousness. Participants work in various forms of expression, including the personal essay, poetry, and short fiction. Prerequisite(s): junior standing. (Summer)

Basic patterns and underlying physical and biotic causes of both regional and local distributions of plants and animals of North
American prairies; field and laboratory analyses and projects. Prerequisite(s): two semesters of introductory biology or consent of instructor; junior standing. (Summer)

IA LL 3124/5124 (890:124g). Wetland Ecology — 4 hrs. Ecology, classification, creation, restoration, and management of wetlands. Field studies examine the composition, structure, and functions of local natural wetlands and restored prairie pothole wetlands. Individual or group projects. Prerequisite(s): junior standing. (Summer)

IA LL 3126/5126 (890:126g). Ornithology — 2-4 hrs. The biology, ecology, and behavior of birds with emphasis on field studies of local avifauna. Group projects stress techniques of population analysis and methodology for population studies. Prerequisite(s): two semesters of introductory biology or consent of instructor; junior standing. (Summer)

IA LL 3127/5127 (890:127g). Introduction to Insect Ecology — 4 hrs. Field and laboratory study of insects, their diversity, and life history. Emphasis on ecology and behavior. Prerequisite(s): junior standing. (Variable)

IA LL 3128/5128 (890:128g). Fish Ecology — 2-4 hrs. Basic principles of fish interaction with the biotic and abiotic environment. Field methods, taxonomy, and biology of fish with emphasis on the fish fauna of northwestern Iowa. Prerequisite(s): junior standing. (Summer)

IA LL 3132 (890:132). Ecology — 4 hrs. Introduction to the evolutionary and basic principles of ecology at the organismal, population, community, and ecosystem levels. Integrates lectures and field studies to examine the distribution and abundance of plants and animals in native ecosystems. Prerequisite(s): two semesters of introductory biology or consent of instructor. (Summer)

IA LL 3134/5134 (890:134g). Animals and their Ecosystems — 4 hrs. Focus on the vertebrate and invertebrate animals of the Midwest. Animals are observed in nature either through passive observational techniques or active trapping exercises. Once identified, animals are placed in their proper taxonomic position (i.e., put onto the "Tree of Life"). They also are put into ecological perspective, including habitat preferences (i.e., wetland, lake prairie, forest, river, edge), trophic position, and activity patterns. Conservation status is discussed and in many cases emphasized. Prerequisite(s): an introductory biology course; junior standing. (Summer)

IA LL 3135/5135 (890:135g). Aquatic Toxicology and Wetland Dynamics in Freshwater Systems — 2 hrs. Fundamental knowledge and understanding of scientific concepts related to the physico-chemical and biological environment; problems and issues (global, national, regional, and local) of freshwater systems; how wetland restoration is used to ameliorate problems; basic tools used to assess aquatic toxicological problems. Prerequisite(s): one year of biology and one year of chemistry; junior standing. (Summer)

IA LL 3140/5140 (890:140g). Water Policy & Politics — 1 hr. Historical, legal, economic, cultural, and political dimensions of water resources; public perception and enjoyment of this abundant and important natural resource; how public policy developed; private rights; differences between the previous appropriation system in the western U.S. and Eastern riparian rights law; public rights regarding water for navigation, recreation, and environmental protection; water-related institutions such as suppliers of municipal water and irrigation water; interbasin transport of water. Prerequisite(s): junior standing. (Summer)

IA LL 3142/5142 (890:142g). Watershed Hydrology and Surficial Processes — 4 hrs. Effects of geomorphology, soils, and land use on transport of water and materials (nutrients and contaminants) in watersheds. Fieldwork will emphasize investigations of the Iowa Great Lakes watershed. Prerequisite(s): four courses in the physical or biological sciences or engineering; junior standing. (Summer)

IA LL 3160/5160 (890:160g). Restoration Ecology — 4 hrs. Ecological principles for the restoration of native ecosystems; establishment (site preparation, selection of seed mixes, and planting techniques) and management (fire, mowing, and weed control) of native vegetation; evaluation of restorations. Emphasis on the restoration of prairie and wetland vegetation. Prerequisite(s): a course in ecology; junior standing. (Summer)

IA LL 3163 (890:163). Conservation Biology — 4 hrs. Population- and community-level examination of factors influencing the viability of plant and animal populations from both demographic and genetic perspectives; assessment of biodiversity; and design and management of preserves. Prerequisite(s): general biology. (Summer)

IA LL 3165/5165 (890:165g). Behavioral Ecology — 4 hrs. Animal coloniality, courtship, territoriality, predator defense, habitat selection, foraging, mating systems, and parental care will be examined in the field in order to evaluate various ecological and evolutionary theories of animal behavior. Prerequisite(s): two courses in the biological sciences; junior standing. (Summer)

IA LL 3166/5166. Amphibians & Reptiles — 2-4 hrs. Ecology, behavior, and conservation biology of amphibians and reptiles. Emphasis on their anatomy and morphology, temperature and water regulation, locomotion, life history, reproduction, population and community ecology, and conservation. (Summer)

IA LL 3175/5175 (890:175g). Soil Formation & Landscape Relationships — 2-4 hrs. Relationships between soil formation, geomorphology, and environment. Soil description, classification, geography, mapping, and interpretation for land use. Prerequisite(s): introductory soils course or IA LL 3142/5142 (890:142g); junior standing. (Summer)

IA LL 4178/5178 (890:178g). Analysis of Environmental Data — 2 hrs. Provides students with training in the theory and application of a range of statistical techniques useful for the analysis of ecological and paleoecological data. Topics include data management, exploratory analysis, regression analysis, direct and indirect ordination methods, classification techniques, transfer functions and the analysis of temporal data. Lectures and practical classes with hands-on-training. Directed towards advanced undergraduate, graduate, and working professionals in ecology and paleoecology. Prerequisite(s): an undergraduate course in statistics, understanding of basic concepts such as correlation and regression, and familiarity with PC-based software for data analysis; junior standing. (Summer)

IA LL 4193 (890:193). Undergraduate Research — 1-4 hrs. Prerequisite(s): junior standing; consent of instructor. (Variable)

IA LL 4198 (890:198). Undergraduate Independent Study — 1-4 hrs. Prerequisite(s): junior standing; consent of instructor. (Variable)
Underlying causes of global climate change, both natural and human; web of interrelated links affecting the physical and living world, including human society; cause-and-effect relationships and interventions that may reduce negative consequences; for teachers of grades 7-12 and students enrolled in teacher education programs for those grades. Prerequisite(s): bachelor's degree. (Summer)

Identification and classification of the common fungi; techniques for identification, preservation, and culture practiced with members of the various fungi groups. (Summer)

Field and laboratory study of freshwater diatoms; techniques in collection, preparation, and identification of diatom samples; study of environmental factors affecting growth, distribution, and taxonomic characters; project design and execution, including construction of reference and voucher collections and data organization and analysis. Prerequisite(s): two semesters of introductory biology or geology, and consent of instructor. (Summer)

Mechanisms of physical transport of heat and contaminants in lakes; temperature cycle and stratification; disturbances to seasonal temperature structure, including the diurnal mixed layer, waves, upwelling, differential heating; turbulence, mixing, transport; field measurements of physical processes, computer models of transport. (Summer)

IA LL 6234. Topics in Ecology and Sustainability — 1-4 hrs.
Scientific introduction to ecology and evolution of important groups of organisms. Topics include: algae to vertebrates, different ecological phenomena (e.g., fire and climate change), varying landforms, different ecosystems (e.g., prairies and aquatic systems); emphasis on sustainability with introduction to concepts, issues, and practices; ability to communicate environmental information through a variety of means. May be repeated. (Summer)

IA LL 6240 (890:240). Natural History Workshop — 1-3 hrs.
Offered as demand warrants. Graduate workshop on some aspect of the natural history of the Upper Midwest or on techniques for studying natural history. Prerequisite(s): consent of instructor. (Variable)

IA LL 6263. Conservation Biology — 4 hrs.
Population- and community-level examination of factors influencing the viability of plant and animal populations from both demographic and genetic perspectives; assessment of biodiversity; and design and management of preserves. (Summer)

IA LL 6291 (890:291). Graduate Internships — 1-5 hrs.
Placement with county conservation boards, camps, parks, schools, etc., for experience as interpreters, rangers, technicians, and teachers. Prerequisite(s): consent of instructor. (Variable)