Biology, B.A.

All biology majors complete a chemistry/mathematics foundation and the biology core. In addition, B.A. students choose courses from several breadth menus and have a wide selection of elective courses, while B.S. students complete physics foundation courses and choose one of four tracks.

The department acquaints undergraduate students with the nature of practicing scientists' work by offering BIOL:3994 Introduction to Research (requires a Department of Biology faculty sponsor), BIOL:4898 Communicating Research (a course supporting students involved in research), and BIOL:4999 Honors Research in Biology (requires membership in the Biology Honors Program). Students associate with one of the department's research groups in experiments, discussion of current research, study of specialized topics, and attendance at research seminars.

Students interested in field biology, zoology, or botany may take varied courses in those subjects offered during the summer at Iowa Lakeside Laboratory.

Learning Outcomes

The graduate with a bachelor's degree in biology will be able to demonstrate the following.

- **Foundational Knowledge: Comprehension of Fundamental Principles and Concepts of Biology**
  
  Graduates will be able to:
  - explain fundamental biological principles within and across levels of organization, from molecules to ecosystem;
  - apply foundational knowledge and conceptual frameworks to new situations;
  - recognize the consequences of evolutionary history in contrasts between living organisms;
  - appreciate the historical sequence and significant achievements of biological discovery; and
  - evaluate new information reported in the news and/or in scientific publications against prior knowledge.

- **New Discovery: Scientific Reasoning and Experimental Process in Biology**
  
  Graduates will be able to:
  - perform basic laboratory procedures, including correct operation of devices;
  - formulate questions about biological processes based on current knowledge;
  - construct a hypothesis to guide experimental enquiry;
  - design experiments, identifying variables of analysis and controls for error;
  - consider appropriate strategies or technologies applicable to investigate a novel problem;
  - collect, organize, summarize, and interpret biological data;
  - analyze and evaluate experimental results to inform a hypothesis; and
  - distinguish between necessary and sufficient causes.

- **Quantitative Skills: Mathematical Reasoning and Basic Numeracy Applied to Biology**
  
  Graduates will be able to:
  - perform essential mathematical operations such as unit conversions, dilutions, and molarity calculations;
  - apply mathematical concepts and rules of probability to make predictions;
  - select and apply appropriate statistical tests to determine significance of experimental results; and
  - use mathematical and/or statistical expressions to evaluate hypotheses with experimental data.

- **Information Literacy: Acquisition, Analysis, and Summary of Published Biological Information**
  
  Graduates will be able to:
  - locate and evaluate the relevance and credibility of information from electronic and print sources;
  - navigate and obtain relevant information from public databases;
  - recognize and appropriately cite sources of information;
  - identify questions addressed and methodologies used; and
  - assess findings reported and conclusions drawn in published scientific articles.

- **Communication Proficiency: Written and Oral Presentation of Biological Information**
  
  Graduates will be able to:
  - write concise scientific reports based on findings or literature searches;
  - construct visual presentations of results or findings from the scientific literature; and
  - orally present findings or results from the literature with appropriate media.

Requirements

The Bachelor of Arts with a major in biology requires a minimum of 120 s.h., including at least 68-77 s.h. of work for the major. Students must maintain a g.p.a. of at least 2.00 in all courses for the major and in all UI courses for the major. They also must complete the College of Liberal Arts and Sciences GE CLAS Core.

The major for the Bachelor of Arts prepares students for graduate study in the biological sciences and is especially appropriate for those interested in careers in biological science education at all levels. It also provides suitable preparation for professional positions in laboratory or field research or for professional study in medicine and other health-related fields.

The B.A. program is broadly based. It introduces students to key concepts in important areas of biology and, compared to the B.S. program, provides more flexibility in choosing elective courses. Students working toward a Bachelor of Arts degree must complete the chemistry/math foundation; the biology core; three courses from the breadth menus; one course
with a laboratory; and five or six elective courses, which may include one course in the history or philosophy of science.

Students who wish to apply transfer credit toward the biology major should consult their biology advisor.

The B.A. with a major in biology requires the following coursework.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Chemistry/Mathematics Foundation Courses</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>Biology Core Courses</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>Breadth Menus</td>
<td>9-13</td>
</tr>
<tr>
<td></td>
<td>Course with a Laboratory</td>
<td>4-6</td>
</tr>
<tr>
<td></td>
<td>Electives</td>
<td>18-21</td>
</tr>
<tr>
<td></td>
<td>Total Hours</td>
<td>68-77</td>
</tr>
</tbody>
</table>

### Chemistry/Mathematics Foundation

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All of these:</td>
<td></td>
</tr>
<tr>
<td>CHEM:1110-</td>
<td>Principles of Chemistry I-II</td>
<td>8</td>
</tr>
<tr>
<td>CHEM:1120</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOC:3110</td>
<td>Biochemistry</td>
<td>3</td>
</tr>
<tr>
<td>One of these:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MATH:1460</td>
<td>Calculus for the Biological Sciences</td>
<td>4</td>
</tr>
<tr>
<td>MATH:1550</td>
<td>Engineering Mathematics I: Single Variable Calculus</td>
<td>4</td>
</tr>
<tr>
<td>MATH:1850</td>
<td>Calculus I</td>
<td>4</td>
</tr>
<tr>
<td>One of these:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>STAT:2010</td>
<td>Statistical Methods and Computing</td>
<td>3</td>
</tr>
<tr>
<td>STAT:3510</td>
<td>Biostatistics</td>
<td>3</td>
</tr>
</tbody>
</table>

### Biology Core

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All of these:</td>
<td></td>
</tr>
<tr>
<td>BIOL:1411-</td>
<td>Foundations of Biology - Diversity of Form and Function</td>
<td>8</td>
</tr>
<tr>
<td>BIOL:1412</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOL:2512</td>
<td>Fundamental Genetics</td>
<td>4</td>
</tr>
<tr>
<td>BIOL:2723</td>
<td>Cell Biology</td>
<td>3</td>
</tr>
<tr>
<td>BIOL:3172</td>
<td>Evolution</td>
<td>4</td>
</tr>
</tbody>
</table>

### Breadth Menus

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Genes and Genomes</td>
<td></td>
</tr>
<tr>
<td>One of these:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOL:3314</td>
<td>Genomics</td>
<td>3</td>
</tr>
<tr>
<td>BIOL:3373</td>
<td>Human Population Genetics and Variation</td>
<td>3</td>
</tr>
<tr>
<td>BIOL:3713</td>
<td>Molecular Genetics</td>
<td>4</td>
</tr>
<tr>
<td>BIOL:4213</td>
<td>Bioinformatics</td>
<td>4</td>
</tr>
<tr>
<td>BIOL:4373</td>
<td>Molecular Evolution: Genes, Genomes, and Organisms</td>
<td>3</td>
</tr>
<tr>
<td>BIOL:4386</td>
<td>Introduction to Scientific Computing for Biologists</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Biological Systems</td>
<td></td>
</tr>
<tr>
<td>Two of these:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Course with a Laboratory

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>One of these (must not have been used as a breadth menu course):</td>
<td></td>
</tr>
<tr>
<td>BIOL:2246</td>
<td>Entomology Lab</td>
<td>4</td>
</tr>
<tr>
<td>BIOL:2346</td>
<td>Vertebrate Zoology</td>
<td>4</td>
</tr>
<tr>
<td>BIOL:3244</td>
<td>Animal Behavior</td>
<td>5</td>
</tr>
<tr>
<td>BIOL:3626</td>
<td>Cell Biology Laboratory</td>
<td>4</td>
</tr>
<tr>
<td>BIOL:3655</td>
<td>Neurogenetics Laboratory</td>
<td>4</td>
</tr>
<tr>
<td>BIOL:3656</td>
<td>Neurobiology Laboratory</td>
<td>4</td>
</tr>
<tr>
<td>BIOL:3676</td>
<td>Evolution Lab</td>
<td>4</td>
</tr>
<tr>
<td>BIOL:3716</td>
<td>Genetics and Biotechnology</td>
<td>4</td>
</tr>
<tr>
<td>BIOL:3736</td>
<td>Developmental Biology Lab</td>
<td>4</td>
</tr>
<tr>
<td>BIOL:4314</td>
<td>Introduction to Synthetic Biology in the Lab</td>
<td>4</td>
</tr>
<tr>
<td>BIOL:4999</td>
<td>Honors Research in Biology</td>
<td>6</td>
</tr>
<tr>
<td>MICR:2157-</td>
<td>General Microbiology</td>
<td>5</td>
</tr>
<tr>
<td>MICR:2158</td>
<td>- General Microbiology Laboratory</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(both courses must be taken in the same semester)</td>
<td></td>
</tr>
</tbody>
</table>

Iowa Lakeside Laboratory courses (consult advisor) | 4-5 |

### Electives

Students complete at least two biology elective courses (prefix BIOL) for 6 s.h. plus 12 s.h. of coursework outside the Department of Biology from the list below. Biology courses may include courses chosen from the "Breadth Menus" list or the "Course with a Laboratory" list above that have not been used to satisfy those requirements; other 2-4 s.h. courses numbered 2000 or above offered by the Department of Biology except for BIOL:2120 Good Genes Gone Bad: Genetic Disorders of Notable Celebrities and BIOL:2211 Genes, Genomes, and the Human Condition; and approved advanced biology courses taught at Iowa Lakeside Laboratory with approval from the advisor.

Students may count BIOL:3994 Introduction to Research (2-3 s.h.) and BIOL:4897 Teaching Internship in Biology (maximum of 2 s.h.) only once toward the elective requirement.
toward the elective requirement: Only one course from the list below may count or take PHYS:1612:

PHYS:1512
PHYS:1611

From the physics courses, students may choose from the following (maximum of two courses); if they select PHYS:1511, they could take PHYS:1512; if they select PHYS:1611, they could take PHYS:1612: 

PHYS:1400 Basic Physics 3-4
or
PHYS:1511 College Physics I 4
PHYS:1512 College Physics II 3-4
or
PHYS:1611 Introductory Physics I
PHYS:1612 Introductory Physics II

Only one course from the list below may count toward the elective requirement:

GEOG:3110 Geography of Health 3
HIST:4162 History of Global Health 3
HIST:4419 Ancient and Medieval Science 3
Biology in Biology

Students may apply 6 s.h. of fulfill the following requirements:

To graduate with honors in the biology major, students must biology and by other departments and programs. courses with honors sections offered by the Department of opportunity to improve their skills in seminar presentation research problem. specific questions and test specific hypotheses related to the has acquired the necessary experimental skills to address supervisor. The thesis should clearly document that a student biological problem, which is usually identified by the research supervisor. Biology honors students write a thesis based on an interesting project guided by a faculty member (the research supervisor). Biology honors students associate with one of the department's research groups and participate in an independent research honors in the major. The Biology Honors Program

Honors

Honors in the Major

Students majoring in biology have the opportunity to graduate with honors in the major. The Biology Honors Program introduces students to the pursuits of practicing scientists. Honors students associate with one of the department's research groups and participate in an independent research project guided by a faculty member (the research supervisor).

Biology honors students write a thesis based on an interesting biological problem, which is usually identified by the research supervisor. The thesis should clearly document that a student has acquired the necessary experimental skills to address specific questions and test specific hypotheses related to the research problem. Honors Seminar in Biology (BIOL:4998), or an equivalent seminar, provides students with an ideal opportunity to improve their skills in seminar presentation and in writing scientific English. Throughout undergraduate residence, departmental honors students also may enroll in courses with honors sections offered by the Department of Biology and by other departments and programs.

To graduate with honors in the biology major, students must fulfill the following requirements:

- complete the requirements for a major in biology with a g.p.a. of at least 3.33 in all coursework in the major taken at the University of Iowa (including all biology courses and cognates in chemistry, biochemistry, mathematics, and statistics);
- complete 1 s.h. in BIOL:4898 Communicating Research;
- complete 2 s.h. in either BIOL:4998 Honors Seminar in Biology or an advanced biology seminar course;
- complete a minimum of 6 s.h. (taken over two or more semesters) of BIOL:4999 Honors Research in Biology;
- write a brief research proposal summarizing the background and goals of their proposed honors research;
- upon completion of their research, submit an acceptable honors thesis; and
- give a brief oral presentation of their research findings to other biology honors students.

Students may apply 6 s.h. of BIOL:4999 Honors Research in Biology toward the required course with a laboratory and count the 2 s.h. earned in BIOL:4998 Honors Seminar in Biology toward the elective requirement.

Biology majors interested in graduating with honors in the major should contact the biology honors advisor as early as possible, preferably during their sophomore or junior year, so that they may be matched with an appropriate lab. Visit Biology Honors Program to learn more about honors study in the department.

Students who are interested in the University of Iowa Honors Program satisfy the level two requirements when they satisfy the biology honors requirements; see University Honors Program below.

University of Iowa Honors Program

In addition to honors in the major, students have opportunities for honors study and activities through membership in the University of Iowa Honors Program. Visit Honors at Iowa to learn about the University's honors program.

Students who satisfy the requirements for honors in the biology major also satisfy the Level Two: Learning by Doing requirement of the University honors curriculum.

Membership in the UI Honors Program is not required to earn honors in the biology major.

Academic Plans

Four-Year Graduation Plan

The following checkpoints list the minimum requirements students must complete by certain semesters in order to stay on the University's Four-Year Graduation Plan. Courses in the major are those required to complete the major; they may be offered by departments other than the major department.


Before the fifth semester begins: BIOL:1412 Diversity of Form and Function, STAT:2010 Statistical Methods and Computing or STAT:3510 Biostatistics, and four other courses in the major

Before the seventh semester begins: BIOL:2512 Fundamental Genetics, BIOL:2723 Cell Biology, BIOL:3172 Evolution, five or six more courses in the major, and at least 90 s.h. earned toward the degree

Before the eighth semester begins: two or three more courses in the major

During the eighth semester: enrollment in all remaining coursework in the major, all remaining GE CLAS Core courses, and a sufficient number of semester hours to graduate

Sample Plan of Study

Sample plans represent one way to complete a program of study. Actual course selection and sequence will vary and should be discussed with an academic advisor. For additional sample plans, see MyUI.
Biology, B.A.

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research:</td>
<td>Iowa Lakeside Laboratory summer field courses a</td>
<td></td>
</tr>
<tr>
<td>Any Semester</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

First Year

Fall

CHEM:1070 General Chemistry I b                                                                 3
MATH:1440 Mathematics for the Biological Sciences b, c                                             4
RHET:1030 Rhetoric or ENGL:1200 The Interpretation of Literature d                              3 - 4
GE CLAS Core: World Languages First Level Proficiency or elective course d                                            4 - 5
CSI:1600 Success at Iowa                                                                         2

Hours 16-18

Spring

CHEM:1110 Principles of Chemistry I b, e                                                        4
MATH:1460 Calculus for the Biological Sciences                                                   4
GE CLAS Core: World Languages Second Level Proficiency or elective course d                      4 - 5
GE CLAS Core: Diversity and Inclusion f                                                         3

Hours 15-16

Second Year

Fall

BIOL:1411 Foundations of Biology                                                                  4
CHEM:1120 Principles of Chemistry II                                                              4
GE CLAS Core: World Languages Second Level Proficiency or elective course d                      4 - 5
GE CLAS Core: Literary, Visual, and Performing Arts                                                3

Hours 15-16

Spring

BIOL:1412 Diversity of Form and Function                                                          4
STAT:2010 Statistical Methods and Computing or STAT:3510 Biostatistics                            3
ENGL:1200 The Interpretation of Literature or RHET:1030 Rhetoric                                  3 - 4
GE CLAS Core: World Languages Fourth Level Proficiency or elective course d                       4 - 5
Elective course g                                                                                3

Hours 17-19

Third Year

Fall

BIOL:2512 Fundamental Genetics                                                                   4
BIOC:3110 Biochemistry                                                                           3
Major: elective outside biology g                                                                  3
GE CLAS Core: Historical Perspectives f                                                             3
GE CLAS Core: Social Sciences f                                                                    3

Hours 16

Spring

BIOL:3172 Evolution                                                                             4
BIOL:2723 Cell Biology                                                                           3
Major: biological systems requirement I                                                             3
Major: elective outside biology g                                                                  3

GE CLAS Core: International and Global Issues f                                                    3
Hours 16

Fourth Year

Fall

Major: biological systems requirement II                                                          3
Major: biology elective I                                                                           3
GE CLAS Core: Values and Culture f                                                                   3
Major: elective outside biology g                                                                    3

Hours 12

Spring

Major: course with a laboratory requirement                                                        4 - 6
Major: genes and genomes requirement                                                               3
Major: biology elective II                                                                          3
Major: elective outside biology g                                                                   3

Degree Application: apply on MyUI before deadline (typically in February for spring, September for fall)

Hours 13-15

Total Hours 120-128

Career Advancement

The major in biology prepares students to enter research or service careers associated with private industry or government programs and for primary and secondary school teaching. It also prepares them to enter advanced degree programs leading to careers in higher education and to independent research in a variety of biological fields, or for practice in health professions such as medicine, dentistry, pharmacy, nursing, veterinary medicine, medical technology, and physical therapy.

The Pomerantz Career Center offers multiple resources to help students find internships and jobs.