Biology, BS

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

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 for experiments, discuss current research, study specialized topics, and attend 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

Graduates 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 diversity of people who have contributed to the 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 inquiry;
- 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 the 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 Science with a major in biology requires a minimum of 120 s.h., including at least 67–75 s.h. of work for the major. Students must maintain a grade-point average of at least 2.00 in all courses for the major and in all UI courses for the major. They must also complete the College of Liberal Arts and Sciences GE CLAS Core.

Students who wish to apply transfer credit toward graduation with a major in biology should consult their biology advisor. Students who earn a degree in biology may not earn a degree in biomedical sciences or neuroscience.

In planning coursework, students should be guided by the College of Liberal Arts and Sciences maximum hours rule: students earning a BS may apply a maximum of 56 s.h. earned in one department to the minimum 120 s.h. required for graduation, whether or not the coursework is accepted toward requirements for the major; students who earn more than 56 s.h. from one department may use the additional semester hours to satisfy requirements for the major (if the department accepts them), and the grades they earn become part of their grade-point average, but they cannot apply the additional semester hours to the minimum 120 s.h. required for graduation.

The BS requires completion of the chemistry/mathematics/physics foundation, the biology core, and one of four tracks. The four tracks emphasize dynamic and active areas in the biological sciences. Three of the tracks—cell and developmental biology, genetics and biotechnology, and neurobiology—emphasize distinct areas. The fourth track—integrative biology—provides highly diverse content.

The BS with a major in biology requires the following coursework.

Requirements	Hours
Chemistry/Mathematics/Physics Foundation	29
Biology Core Courses	15
Track Courses	23-31

Chemistry/Mathematics/Physics Foundation

Course #	Title	Hours
All of these:		
CHEM:1110 & CHEM:1120	Principles of Chemistry I and Principles of Chemistry II	8
CHEM:2210	Organic Chemistry I	3
One of these:		
BMB:3110	Biochemistry	3
BMB:3120	Biochemistry and Molecular Biology I (students who take BMB:3120 must also take BMB:3130 as one of their track courses)	3
One of these sequences:		
PHYS:1511 & PHYS:1512	College Physics I and College Physics II	8
PHYS:1611 & PHYS:1612	Introductory Physics I and Introductory Physics II	8
One of these:		
MATH:1460	Calculus for the Biological Sciences	4
MATH:1850	Calculus I	4
One of these:		
STAT:2010	Statistical Methods and Computing	3
STAT:3510	Biostatistics	3

Biology Core

Course #	Title	Hours
All of these:		
BIOL:1411 & BIOL:1412	Foundations of Biology and Diversity of Form and Function	8
BIOL:2512	Fundamental Genetics	4
BIOL:2723	Cell Biology	3

Tracks

Bachelor of Science students must select a single track. The experiential elective requirement may be satisfied by taking an appropriate investigative lab for the track, or through several other options. Students who use BIOL:4999 Honors Research in Biology or BIOL:3994 Introduction to Research must complete a minimum of 6 s.h. in those courses. Students who use BIOL:4897 Teaching Internship in Biology must complete a minimum of 4 s.h. in that course.

Additionally, students may satisfy the experiential elective requirement by completing at least 4 s.h. in two different courses from a combination of these courses: BIOL:3994 Introduction to Research, BIOL:4898 Communicating Research, BIOL:4897 Teaching Internship in Biology, BIOL:4999 Honors Research in Biology, LATH:3001 Latham Fellows: Science Outreach Project, and an approved biology-related internship.

- Cell and Developmental Biology Track
- Genetics and Biotechnology Track
- Integrative Biology Track
- Neurobiology Track

Cell and Developmental Biology Track

The cell and developmental biology track provides education in the structure and function of cells and in the principles of development as they apply to animals and plants. This track is appropriate for students who wish to pursue graduate study in cellular and developmental biology, to prepare for professional study in medicine and other health-related fields, or to take positions in laboratories and companies engaged in cancer research and related fields.

Cell and Developmental Biology Track Courses

Course #	Title	Hours
Two of these:		
BIOL:3172	Evolution	4
BIOL:3233	Introduction to Developmental Biology	3
BIOL:3363	Plant Developmental Biology	3
One of these:		
BIOL:3626	Cell Biology Laboratory	4
BIOL:3736	Developmental Biology Lab	4
One of these:		
BIOL:3212	Bioinformatics for Beginners	3
BMB:3130	Biochemistry and Molecular Biology II (students who take BMB:3120 as a chemistry/mathematics/physics foundation course must take this course)	3
CHEM:2220	Organic Chemistry II	3
MICR:2157 & MICR:2158	General Microbiology and General Microbiology Laboratory	5

Cell and Developmental Biology Track Experiential Elective

Course #	Title	Hours
One of these:		
BIOL:3245	Animal Behavior Laboratory	4
BIOL:3626	Cell Biology Laboratory (if not taken as a track course)	4
BIOL:3655	Neurogenetics Laboratory	4
BIOL:3656	Neurobiology Laboratory	4
BIOL:3676	Evolution Lab	4
BIOL:3716	Genetics and Biotechnology Lab	4

BIOL:3736	Developmental Biology Lab (if not taken as a track course)	4
BIOL:3994	Introduction to Research (taken over two or more semesters for a total of 6 hours)	6
BIOL:4897	Teaching Internship in Biology (taken twice for 2 s.h. each)	4
BIOL:4999	Honors Research in Biology	6
or		
A combination of at least two different courses for a total of 4 s.h. from these:		
BIOL:3994	Introduction to Research	1-3
BIOL:4897	Teaching Internship in Biology	1-3
BIOL:4898	Communicating Research	2
BIOL:4999	Honors Research in Biology	arr.
LATH:3001	Latham Fellows: Science Outreach Project	2
An approved biology-related internship		

Cell and Developmental Biology Track Electives

Course #	Title	Hours
At least two of these (if not taken to fulfill a track requirement), with a minimum of one course numbered 3000 or above:		
BIOL:2254	Endocrinology	3
BIOL:2753	Introduction to Neurobiology	3
BIOL:3172	Evolution	4
BIOL:3233	Introduction to Developmental Biology	3
BIOL:3244	Animal Behavior	3
BIOL:3253	Neurobiology I	4
BIOL:3314	Genomics	3
BIOL:3343	Animal Physiology	3
BIOL:3363	Plant Developmental Biology	3
BIOL:3713	Molecular Genetics	4
BIOL:4123	Cell Biology of the Nervous System	3
BIOL:4333	Genes and Development	3
May include one of these:		
BIOL:2663	Plant Response to the Environment	3
BIOL:3663	Plant Response to the Environment	3

Genetics and Biotechnology Track

The genetics and biotechnology track provides education in the key principles of transmission, maintenance, regulation, and manipulation of genes. This track is appropriate for students who wish to pursue graduate study in fields related to genetics or to enter the modern biotechnology industry. It also provides excellent preparation for professional study in medicine and other health-related fields.

Genetics and Biotechnology Track Courses

Course #	Title	Hours
Two of these:		
BIOL:3172	Evolution	4
BIOL:3314	Genomics	3
BIOL:3713	Molecular Genetics	4
This course:		
BIOL:3716	Genetics and Biotechnology Lab	4
One of these:		
BIOL:3212	Bioinformatics for Beginners	3
BMB:3130	Biochemistry and Molecular Biology II (students who take BMB:3120 as a chemistry/mathematics/physics foundation course must take this course)	3
CHEM:2220	Organic Chemistry II	3
MICR:2157 & MICR:2158	General Microbiology and General Microbiology Laboratory	5

Genetics and Biotechnology Track Experiential Elective

Course #	Title	Hours
One of these:		
BIOL:3245	Animal Behavior Laboratory	4
BIOL:3626	Cell Biology Laboratory	4
BIOL:3655	Neurogenetics Laboratory	4
BIOL:3676	Evolution Lab	4
BIOL:3736	Developmental Biology Lab	4
BIOL:3994	Introduction to Research (taken over 2 or more semesters for a total of 6 hours)	6
BIOL:4897	Teaching Internship in Biology (taken twice for 2 s.h. each)	4
BIOL:4999	Honors Research in Biology	6
or		
A combination of at least two different courses for a total of 4 s.h. from these:		
BIOL:3994	Introduction to Research	1-3
BIOL:4897	Teaching Internship in Biology	1-3
BIOL:4898	Communicating Research	2
BIOL:4999	Honors Research in Biology	arr.
LATH:3001	Latham Fellows: Science Outreach Project	2
An approved biology-related internship		

Genetics and Biotechnology Track Electives

Course #	Title	Hours
At least two of these (if not taken to fulfill a track requirement), with a minimum of one course numbered 3000 or above:		
BIOL:2254	Endocrinology	3
BIOL:2673	Ecology	3
BIOL:2753	Introduction to Neurobiology	3

BIOL:3172	Evolution	4
BIOL:3233	Introduction to Developmental Biology	3
BIOL:3244	Animal Behavior	3
BIOL:3253	Neurobiology I	4
BIOL:3314	Genomics	3
BIOL:3343	Animal Physiology	3
BIOL:3363	Plant Developmental Biology	3
BIOL:3373	Human Population Genetics and Variation	3
BIOL:3713	Molecular Genetics	4
BIOL:4123	Cell Biology of the Nervous System	3
BIOL:4333	Genes and Development	3
BIOL:4373	Molecular Evolution: Genes, Genomes, and Organisms	3
BIOL:4386	Introduction to Scientific Computing for Biologists	3
May include one of these:		
BIOL:2663	Plant Response to the Environment	3
BIOL:3663	Plant Response to the Environment	3

Integrative Biology Track

The integrative biology track offers a diverse, well-balanced introduction to the major fields of biology. This track prepares students for graduate study in the biological sciences, in science education, and for work in laboratories that engage in research and applications in many fields of biology. It also provides broadly based preparation for professional study in medicine and other health-related fields.

Integrative Biology Track Courses

Course #	Title	Hours
Both of these:		
BIOL:2673	Ecology	3
BIOL:3172	Evolution	4
One of these:		
BIOL:2374	Biogeography	3
BIOL:3212	Bioinformatics for Beginners	3
BMB:3130	Biochemistry and Molecular Biology II (students who take BMB:3120 as a chemistry/mathematics/physics foundation course must take this course)	3
CHEM:2220	Organic Chemistry II	3
MICR:2157 & MICR:2158	General Microbiology and General Microbiology Laboratory	5

Integrative Biology Track Breadth Menus

Genes and Genomes

Course #	Title	Hours
One of these:		
BIOL:3314	Genomics	3
BIOL:3373	Human Population Genetics and Variation	3
BIOL:3713	Molecular Genetics	4
BIOL:4333	Genes and Development	3
BIOL:4373	Molecular Evolution: Genes, Genomes, and Organisms	3
BIOL:4386	Introduction to Scientific Computing for Biologists	3

Biological Systems

Course #	Title	Hours
One of these:		
BIOL:2254	Endocrinology	3
BIOL:2753	Introduction to Neurobiology	3
BIOL:3233	Introduction to Developmental Biology	3
BIOL:3244	Animal Behavior	3
BIOL:3343	Animal Physiology	3
BIOL:3363	Plant Developmental Biology	3
May include one of these:		
BIOL:2663	Plant Response to the Environment	3
BIOL:3663	Plant Response to the Environment	3

Investigative Lab

Course #	Title	Hours
One of these:		
BIOL:2246	Entomology Lab	4
BIOL:3245	Animal Behavior Laboratory	4
BIOL:3626	Cell Biology Laboratory	4
BIOL:3655	Neurogenetics Laboratory	4
BIOL:3656	Neurobiology Laboratory	4
BIOL:3676	Evolution Lab	4
BIOL:3716	Genetics and Biotechnology Lab	4
BIOL:3736	Developmental Biology Lab	4

Integrative Biology Track Experiential Elective

Course #	Title	Hours
One of these (if not taken for the investigative lab):		
BIOL:2246	Entomology Lab	4
BIOL:3245	Animal Behavior Laboratory	4
BIOL:3626	Cell Biology Laboratory	4
BIOL:3655	Neurogenetics Laboratory	4
BIOL:3656	Neurobiology Laboratory	4
BIOL:3676	Evolution Lab	4
BIOL:3716	Genetics and Biotechnology Lab	4
BIOL:3736	Developmental Biology Lab	4
BIOL:3994	Introduction to Research (taken over at least 2 semesters for a total of 6 hours)	6
BIOL:4897	Teaching Internship in Biology (taken twice for 2 s.h. each)	4
BIOL:4999	Honors Research in Biology	6
An approved Iowa Lakeside Laboratory course		4
or		
A combination of at least two different courses for a total of 4 s.h. from these:		

BIOL:3994	Introduction to Research	1-3
BIOL:4897	Teaching Internship in Biology	1-3
BIOL:4898	Communicating Research	2
BIOL:4999	Honors Research in Biology	arr.
LATH:3001	Latham Fellows: Science Outreach Project	2
An approved biology-related internship		

Neurobiology Track

The neurobiology track provides education in nervous system function at all levels, from molecular to systems biology. This track is appropriate for students who wish to pursue graduate study in neurobiology and related areas, including psychology and the social sciences; to enter laboratories that study the therapeutic basis of neurological disorders; or to work in pharmaceutical companies. It also provides good preparation for professional study in medicine and other health-related fields.

Neurobiology Track Courses

Course #	Title	Hours
All of these:		
BIOL:2753	Introduction to Neurobiology	3
BIOL:3253	Neurobiology I	4
BIOL:3254	Neurobiology II	4
One of these:		
BIOL:3245	Animal Behavior Laboratory	4
BIOL:3655	Neurogenetics Laboratory	4
BIOL:3656	Neurobiology Laboratory	4
One of these:		
BIOL:3212	Bioinformatics for Beginners	3
BMB:3130	Biochemistry and Molecular Biology II (students who take BMB:3120 as a chemistry/mathematics/physics foundation course must take this course)	3
CHEM:2220	Organic Chemistry II	3
MICR:2157 & MICR:2158	General Microbiology and General Microbiology Laboratory	5
PSY:3055	Interdisciplinary Science of Sound and Hearing	3
PSY:3250	Neuroscience of Learning and Memory	3

Neurobiology Experiential Elective

Course #	Title	Hours
One of these (if not used as a track course):		
BIOL:3245	Animal Behavior Laboratory	4
BIOL:3626	Cell Biology Laboratory	4
BIOL:3655	Neurogenetics Laboratory	4
BIOL:3656	Neurobiology Laboratory	4
BIOL:3676	Evolution Lab	4
BIOL:3716	Genetics and Biotechnology Lab	4
BIOL:3736	Developmental Biology Lab	4
BIOL:3994	Introduction to Research (taken over 2 or more semesters for a total of 6 hours)	6
BIOL:4897	Teaching Internship in Biology (taken twice for 2 s.h. each)	4
BIOL:4999	Honors Research in Biology	6
or		
A combination of at least two different courses for a total of 4 s.h. from these:		
BIOL:3994	Introduction to Research	1-3
BIOL:4897	Teaching Internship in Biology	1-3
BIOL:4898	Communicating Research	2
BIOL:4999	Honors Research in Biology	arr.
LATH:3001	Latham Fellows: Science Outreach Project	2
An approved biology-related internship		

Neurobiology Electives

Course #	Title	Hours
One of these:		
BIOL:2254	Endocrinology	3
BIOL:3172	Evolution	4
BIOL:3233	Introduction to Developmental Biology	3
BIOL:3244	Animal Behavior	3
BIOL:3343	Animal Physiology	3
BIOL:4123	Cell Biology of the Nervous System	3
BIOL:4333	Genes and Development	3
BIOL:4355	Neuroimmunology	3
BIOL:4386	Introduction to Scientific Computing for Biologists	3

Teacher Licensure

Students interested in teaching in elementary and/or secondary schools should seek admission to the Teacher Education Program (TEP) in the College of Education.

To qualify for licensure in secondary teaching, students in the TEP complete a degree in education as well as a related College of Liberal Arts and Sciences degree. See Apply on the College of Education website for details on requirements and deadlines for applying to the College of Education and about TEP choices of majors leading to licensure.

Combined Programs

BS/MAT (Science Education Subprogram)

Students interested in pursuing a graduate degree in teaching may apply to the combined Bachelor of Science/Master of Arts in Teaching with a science education subprogram offered by the College of Liberal Arts and Sciences and the College of Education. The combined program enables students to earn a BS in biology and an MAT in five years by beginning to earn graduate credit during their fourth year of undergraduate study and by counting qualifying credit toward both degrees. For more information, see Science Education in the Master of

Arts in Teaching (College of Education) section of the catalog. Interested students should consult an advisor.

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 the student has acquired the necessary experimental skills to address specific questions and test specific hypotheses related to the research problem. Throughout undergraduate residence, departmental honors students may also enroll in courses with honors sections offered by the Department of Biology and 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 grade-point average (GPA) 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, physics, biochemistry, mathematics, and statistics) and a cumulative University of Iowa GPA of at least 3.33;
- complete 2 s.h. in BIOL:4898 Communicating Research or a related approved 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 pursuing a BS in biology may apply 6 s.h. of BIOL:4999 toward the experiential elective requirement in an appropriate track.

Biology majors interested in graduating with honors in the major should contact the biology 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 of Iowa 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 experiential learning requirement of the university honors curriculum.

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

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.

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 third semester begins: MATH:1460 Calculus for the Biological Sciences or MATH:1850 Calculus I, CHEM:1110 Principles of Chemistry I, CHEM:1120 Principles of Chemistry II, and BIOL:1411 Foundations of Biology.

Before the fifth semester begins: BIOL:1412 Diversity of Form and Function, CHEM:2210 Organic Chemistry I, STAT:2010 Statistical Methods and Computing or STAT:3510 Biostatistics, and two other courses in the major.

Before the seventh semester begins: BIOL:2512 Fundamental Genetics; PHYS:1511 College Physics I and PHYS:1512 College Physics II, or equivalents; six or seven 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 Plans 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, BS

- Cell and Developmental Biology Track
- Genetics and Biotechnology Track
- Integrative Biology Track
- Neurobiology Track

Cell and Developmental Biology Track

Course	Title	Hours
Academic Career		
Any Semester		
GE CLAS Core: Sustainability [a]		
	Hours	**0**
First Year		
Fall		
CHEM:1110	Principles of Chemistry I [b]	4
RHET:1030 or ENGL:1200	Rhetoric: Writing and Communication or Interpreting Literature	3 - 4
MATH:1460	Calculus for the Biological Sciences [c]	4
GE CLAS Core: Understanding Cultural Perspectives [d]		3
CSI:1600	Success at Iowa	1
	Hours	**15-16**
Spring		
BIOL:1411	Foundations of Biology	4
CHEM:1120	Principles of Chemistry II	4
RHET:1030 or ENGL:1200	Rhetoric: Writing and Communication or Interpreting Literature	3 - 4
GE CLAS Core: Social Sciences [d]		3
	Hours	**14-15**
Second Year		
Any Semester		
Research: students interested in research should begin the placement search process in the second year.		
	Hours	**0**
Fall		
BIOL:1412	Diversity of Form and Function	4
CHEM:2210	Organic Chemistry I	3
STAT:3510 or STAT:2010	Biostatistics or Statistical Methods and Computing	3
GE CLAS Core: World Languages First Level Proficiency or elective course [e]		4 - 5
	Hours	**14-15**
Spring		
BIOL:2723	Cell Biology	3
GE CLAS Core: Historical Perspectives [d]		3
Major: foundation track course [f]		3 - 5
GE CLAS Core: World Languages Second Level Proficiency or elective course [e]		4 - 5
Elective course [g]		3
	Hours	**16-19**
Third Year		
Fall		
BIOL:2512	Fundamental Genetics	4
Major: foundation track course - BMB:3110 Biochemistry or BMB:3120 Biochemistry and Molecular Biology I [h]		3
PHYS:1511	College Physics I	4
GE CLAS Core: World Languages Third Level Proficiency or elective course [e]		4 - 5
	Hours	**15-16**
Spring		
BIOL:3172 or BIOL:3363 or BIOL:3233	Evolution or Plant Developmental Biology or Introduction to Developmental Biology	3 - 4
PHYS:1512	College Physics II	4
Major: cell and developmental biology elective I [i]		3
GE CLAS Core: World Languages Fourth Level Proficiency or elective course [e]		4 - 5
	Hours	**14-16**
Fourth Year		
Fall		
BIOL:3626 or BIOL:3736	Cell Biology Laboratory or Developmental Biology Lab	4
BIOL:3363 or BIOL:3233 or BIOL:3172	Plant Developmental Biology or Introduction to Developmental Biology or Evolution	3 - 4
GE CLAS Core: International and Global Issues [d]		3
Elective course [g]		3
Elective course [g]		3
	Hours	**16-17**
Spring		
Major: cell and developmental biology elective II [i]		3
Major: experiential requirement [j]		4
GE CLAS Core: Literary, Visual, and Performing Arts [d]		3
GE CLAS Core: Values and Society [d]		3
Elective course [g]		3
Degree Application: apply on MyUI before deadline (typically in February for spring, September for fall) [k]		
	Hours	**16**
	Total Hours	**120-130**

a Sustainability must be completed by choosing a course that has been approved for Sustainability AND for one of these General Education areas: Natural Sciences; Quantitative or Formal Reasoning; Social Sciences; Historical Perspectives; International and Global Issues; Literary, Visual, and Performing Arts; or Values and Society.

b Enrollment in chemistry courses requires completion of a placement exam.

c Enrollment in math courses requires completion of a placement exam.

d GE CLAS Core courses may be completed in any order unless used as a prerequisite for another course. Students should consult with an advisor about the best sequencing of courses.

e Students who have completed four levels of a single language or two levels of two different languages in high school or college have satisfied the GE CLAS Core World Languages requirement. Students who have completed three levels of a single language may complete a fourth-level course in the same language or may choose an approved World Language and Cultural Exploration course. Enrollment in world languages courses requires a placement exam, unless enrolling in a first-semester-level course. Contact your academic advisor or CLAS Undergraduate

Programs Office with questions concerning the World Languages requirement.

f See General Catalog for list of approved courses. Students who took BMB:3120 must take BMB:3130.

g Students may use elective courses to earn credit towards the total s.h. required for graduation or to complete a double major, minors, or certificates.

h Students who take BMB:3120 also must take BMB:3130 as one of their track courses.

i At least one elective in the major must be numbered 3000 or above.

j See General Catalog for list of approved options; some may require more than one semester.

k Please see Academic Calendar, on Office of the Registrar website, for current degree application deadlines. Students should apply for a degree for the session in which all requirements will be met. For any questions on appropriate timing, contact your academic advisor or Degree Services.

Genetics and Biotechnology Track

Course	Title	Hours
Academic Career		
Any Semester		
GE CLAS Core: Sustainability [a]		
	Hours	**0**
First Year		
Fall		
CHEM:1110	Principles of Chemistry I [b]	4
RHET:1030 or ENGL:1200	Rhetoric: Writing and Communication or Interpreting Literature	3 - 4
MATH:1460	Calculus for the Biological Sciences [c]	4
GE CLAS Core: Understanding Cultural Perspectives [d]		3
CSI:1600	Success at Iowa	1
	Hours	**15-16**
Spring		
BIOL:1411	Foundations of Biology	4
CHEM:1120	Principles of Chemistry II	4
RHET:1030 or ENGL:1200	Rhetoric: Writing and Communication or Interpreting Literature	3 - 4
GE CLAS Core: Values and Society [d]		3
	Hours	**14-15**
Second Year		
Any Semester		
Research: students interested in research should begin the placement search process in the second year.		
	Hours	**0**
Fall		
BIOL:1412	Diversity of Form and Function	4
CHEM:2210	Organic Chemistry I	3
STAT:2010 or STAT:3510	Statistical Methods and Computing or Biostatistics	3
GE CLAS Core: World Languages First Level Proficiency or elective course [e]		4 - 5
	Hours	**14-15**
Spring		
BIOL:2512	Fundamental Genetics	4
BIOL:2723	Cell Biology	3
GE CLAS Core: Social Sciences [d]		3
GE CLAS Core: World Languages Second Level Proficiency or elective course [e]		4 - 5
Elective course [f]		3
	Hours	**17-18**
Third Year		
Fall		
BIOL:3172 or BIOL:3713	Evolution [g] or Molecular Genetics	4
Major: foundation track course - BMB:3110 Biochemistry or BMB:3120 Biochemistry and Molecular Biology I [h]		3 - 5
GE CLAS Core: Literary, Visual, and Performing Arts [d]		3
GE CLAS Core: World Languages Third Level Proficiency or elective course [e]		4 - 5
	Hours	**14-17**
Spring		
BIOL:3314 or BIOL:3172	Genomics [g] or Evolution	3 - 4
PHYS:1511	College Physics I	4
Major: Foundation track course [i]		3 - 5
GE CLAS Core: World Languages Fourth Level Proficiency or elective course [e]		4 - 5
	Hours	**14-18**
Fourth Year		
Fall		
PHYS:1512	College Physics II	4
Major: genetics elective I [j]		3
Major: experiential elective [k]		4
GE CLAS Core: International and Global Issues [d]		3
Elective course [f]		3
	Hours	**17**
Spring		
BIOL:3716	Genetics and Biotechnology Lab	4
Major: genetics elective II [j]		3
GE CLAS Core: Historical Perspectives [d]		3
Elective course [f]		3
Elective course [f]		3
Degree Application: apply on MyUI before deadline (typically in February for spring, September for fall) [l]		
	Hours	**16**
	Total Hours	**121-132**

a Sustainability must be completed by choosing a course that has been approved for Sustainability AND for one of these General Education areas: Natural Sciences; Quantitative or Formal Reasoning; Social Sciences; Historical Perspectives; International and Global Issues; Literary, Visual, and Performing Arts; or Values and Society.

b Enrollment in chemistry courses requires completion of a placement exam.

c Enrollment in math courses requires completion of a placement exam.

d GE CLAS Core courses may be completed in any order unless used as a prerequisite for another course. Students

should consult with an advisor about the best sequencing of courses.

e Students who have completed four levels of a single language or two levels of two different languages in high school or college have satisfied the GE CLAS Core World Languages requirement. Students who have completed three levels of a single language may complete a fourth-level course in the same language or may choose an approved World Language and Cultural Exploration course. Enrollment in world languages courses requires a placement exam, unless enrolling in a first-semester-level course. Contact your academic advisor or CLAS Undergraduate Programs Office with questions concerning the World Languages requirement.

f Students may use elective courses to earn credit towards the total s.h. required for graduation or to complete a double major, minors, or certificates.

g Two of the three courses need to be taken for this track: BIOL:3172, BIOL:3314, or BIOL:3713. BIOL:3314 is typically only offered during spring semesters.

h Students who take BMB:3120 also must take BMB:3130 as one of their track courses.

i See General Catalog for list of approved courses. Students who took BMB:3120 must take BMB:3130.

j At least one elective must be numbered 3000 or above.

k See General Catalog for list of approved options; some may require more than one semester.

l Please see Academic Calendar, on Office of the Registrar website, for current degree application deadlines. Students should apply for a degree for the session in which all requirements will be met. For any questions on appropriate timing, contact your academic advisor or Degree Services.

Integrative Biology Track

Course	Title	Hours
Academic Career		
Any Semester		
GE CLAS Core: Sustainability [a]		
Research: Iowa Lakeside Laboratory summer field courses [b]		
	Hours	**0**
First Year		
Fall		
CHEM:1110	Principles of Chemistry I [c]	4
ENGL:1200 or RHET:1030	Interpreting Literature or Rhetoric: Writing and Communication	3 - 4
MATH:1460	Calculus for the Biological Sciences [d]	4
GE CLAS Core: Social Sciences [e]		3
CSI:1600	Success at Iowa	1
	Hours	**15-16**
Spring		
BIOL:1411	Foundations of Biology	4
CHEM:1120	Principles of Chemistry II	4
ENGL:1200 or RHET:1030	Interpreting Literature or Rhetoric: Writing and Communication	3 - 4
GE CLAS Core: Understanding Cultural Perspectives [e]		3
	Hours	**14-15**
Second Year		
Any Semester		
Research: students interested in research should begin the placement search process in the second year.		
	Hours	**0**
Fall		
BIOL:1412	Diversity of Form and Function	4
CHEM:2210	Organic Chemistry I	3
STAT:2010 or STAT:3510	Statistical Methods and Computing or Biostatistics	3
GE CLAS Core: World Languages First Level Proficiency or elective course [f]		4 - 5
	Hours	**14-15**
Spring		
BIOL:2512	Fundamental Genetics	4
BIOL:2673	Ecology	3
PHYS:1511	College Physics I	4
GE CLAS Core: World Languages Second Level Proficiency or elective course [f]		4 - 5
	Hours	**15-16**
Third Year		
Fall		
BIOL:2723	Cell Biology	3
PHYS:1512	College Physics II	4
Major: foundation track course - BMB:3110 Biochemistry or BMB:3120 Biochemistry and Molecular Biology I [g]		3
GE CLAS Core: World Languages Third Level Proficiency or elective course [f]		4 - 5
Elective course [h]		3
	Hours	**17-18**
Spring		
BIOL:3172	Evolution	4
Major: foundation track course [i]		3 - 5
GE CLAS Core: Historical Perspectives [e]		3
GE CLAS Core: World Languages Fourth Level Proficiency or elective course [f]		4 - 5
	Hours	**14-17**
Fourth Year		
Fall		
Major: investigative lab		4
Major: biological systems course		3
GE CLAS Core: International and Global Issues [e]		3
Elective course [h]		3
Elective course [h]		3
	Hours	**16**
Spring		
Major: genes and genomes course		3
Major: experiential elective [j]		4
GE CLAS Core: Literary, Visual, and Performing Arts [e]		3
GE CLAS Core: Values and Society [e]		3
Elective course		3

Degree Application: apply on MyUI before deadline (typically in February for spring, September for fall) [k]	
Hours	**16**
Total Hours	**121-129**

a Sustainability must be completed by choosing a course that has been approved for Sustainability AND for one of these General Education areas: Natural Sciences; Quantitative or Formal Reasoning; Social Sciences; Historical Perspectives; International and Global Issues; Literary, Visual, and Performing Arts; or Values and Society.

b After completing BIOL:1412 Diversity of Form & Function, students are eligible to enroll in Lakeside Laboratory summer field courses. Registration for these courses is in winter of each year.

c Enrollment in chemistry courses requires completion of a placement exam.

d Enrollment in math courses requires completion of a placement exam.

e GE CLAS Core courses may be completed in any order unless used as a prerequisite for another course. Students should consult with an advisor about the best sequencing of courses.

f Students who have completed four levels of a single language or two levels of two different languages in high school or college have satisfied the GE CLAS Core World Languages requirement. Students who have completed three levels of a single language may complete a fourth-level course in the same language or may choose an approved World Language and Cultural Exploration course. Enrollment in world languages courses requires a placement exam, unless enrolling in a first-semester-level course. Contact your academic advisor or CLAS Undergraduate Programs Office with questions concerning the World Languages requirement.

g Students who take BMB:3120 also must take BMB:3130 as one of their track courses.

h Students may use elective courses to earn credit towards the total s.h. required for graduation or to complete a double major, minors, or certificates.

i See General Catalog for list of approved courses. Students who took BMB:3120 must take BMB:3130.

j See General Catalog for list of approved options; some may require more than one semester.

k Please see Academic Calendar, on Office of the Registrar website, for current degree application deadlines. Students should apply for a degree for the session in which all requirements will be met. For any questions on appropriate timing, contact your academic advisor or Degree Services.

Neurobiology Track

Course	Title	Hours
Academic Career		
Any Semester		
GE CLAS Core: Sustainability [a]		
	Hours	**0**
First Year		
Fall		
CHEM:1110	Principles of Chemistry I [b]	4
ENGL:1200 or RHET:1030	Interpreting Literature or Rhetoric: Writing and Communication	3 - 4
MATH:1460	Calculus for the Biological Sciences [c]	4
GE CLAS Core: Social Sciences [d]		3
CSI:1600	Success at Iowa	1
	Hours	**15-16**
Spring		
BIOL:1411	Foundations of Biology	4
CHEM:1120	Principles of Chemistry II	4
RHET:1030 or ENGL:1200	Rhetoric: Writing and Communication or Interpreting Literature	3 - 4
GE CLAS Core: Understanding Cultural Perspectives [d]		3
	Hours	**14-15**
Second Year		
Any Semester		
Research: Students interested in research should begin the placement search process in the second or third year.		
	Hours	**0**
Fall		
BIOL:1412	Diversity of Form and Function	4
CHEM:2210	Organic Chemistry I	3
STAT:2010 or STAT:3510	Statistical Methods and Computing or Biostatistics	3
GE CLAS Core: World Languages First Level Proficiency or elective course [e]		4 - 5
	Hours	**14-15**
Spring		
BIOL:2512	Fundamental Genetics	4
BIOL:2753	Introduction to Neurobiology	3
GE CLAS Core: Historical Perspectives [d]		3
GE CLAS Core: World Languages Second Level Proficiency or elective course [e]		4 - 5
Elective course [f]		3
	Hours	**17-18**
Third Year		
Fall		
BIOL:2723	Cell Biology	3
BMB:3120 or BMB:3110	Biochemistry and Molecular Biology I [g] or Biochemistry	3
PHYS:1511	College Physics I	4
GE CLAS Core: World Languages Third Level Proficiency or elective course [e]		4 - 5
Elective course [f]		3
	Hours	**17-18**
Spring		
BMB:3130	Biochemistry and Molecular Biology II [h]	3
PHYS:1512	College Physics II	4
Major: neurobiology elective I [i]		3 - 4
GE CLAS Core: World Languages Fourth Level Proficiency or elective course [e]		4 - 5
	Hours	**14-16**
Fourth Year		
Fall		
BIOL:3253	Neurobiology I	4

BIOL:3656 or BIOL:3655 or BIOL:3245	Neurobiology Laboratory or Neurogenetics Laboratory or Animal Behavior Laboratory	4
GE CLAS Core: Values and Society [d]		3
GE CLAS Core: International and Global Issues [d]		3
Elective course [f]		3
	Hours	**17**
Spring		
BIOL:3254	Neurobiology II	4
Major: experiential elective [j]		4
GE CLAS Core: Literary, Visual, and Performing Arts [d]		3
Major: Elective course [i]		3
Degree Application: apply on MyUI before deadline (typically in February for spring, September for fall) [k]		
	Hours	**14**
	Total Hours	**122-129**

a Sustainability must be completed by choosing a course that has been approved for Sustainability AND for one of these General Education areas: Natural Sciences; Quantitative or Formal Reasoning; Social Sciences; Historical Perspectives; International and Global Issues; Literary, Visual, and Performing Arts; or Values and Society.

b Enrollment in chemistry courses requires completion of a placement exam.

c Enrollment in math courses requires completion of a placement exam.

d GE CLAS Core courses may be completed in any order unless used as a prerequisite for another course. Students should consult with an advisor about the best sequencing of courses.

e Students who have completed four levels of a single language or two levels of two different languages in high school or college have satisfied the GE CLAS Core World Languages requirement. Students who have completed three levels of a single language may complete a fourth-level course in the same language or may choose an approved World Language and Cultural Exploration course. Enrollment in world languages courses requires a placement exam, unless enrolling in a first-semester-level course. Contact your academic advisor or CLAS Undergraduate Programs Office with questions concerning the World Languages requirement.

f Students may use elective courses to earn credit towards the total s.h. required for graduation or to complete a double major, minors, or certificates.

g Students who take BMB:3120 also must take BMB:3130.

h See General Catalog for list of approved courses. Students who took BMB:3120 must take BMB:3130.

i Students may use elective courses to earn credit towards the total s.h. required for graduation or to complete a double major, minors, or certificates.

j See General Catalog for list of approved options; some may require more than one semester.

k Please see Academic Calendar, on Office of the Registrar website, for current degree application deadlines. Students should apply for a degree for the session in which all requirements will be met. For any questions on appropriate timing, contact your academic advisor or Degree Services.