

Bachelor of Science in Ecology, Evolution, and Organismal Biology

Ecology, Evolution, and Organismal Biology

The B.S. focuses on the integration of biological systems at the whole organism level, and on how living organisms exist in populations, species, and communities within their environment. Core classes such as genetics, ecology, and evolutionary biology are combined with courses such as statistics, biochemistry, systematics, and organismal diversity to provide a strong foundation in biology. Students choose electives from a diverse set of classes that allow them to focus on areas of interest.

Undergraduate Admission

Admission to KU

All students applying for admission must send high school and college transcripts to the Office of Admissions. Prospective first-year students should be aware that KU has qualified admission requirements that all new first-year students must meet to be admitted. Consult the Office of Admissions (<http://admissions.ku.edu/>) for application deadlines and specific admission requirements.

Visit the International Support Services (<http://www.iss.ku.edu/>) for information about international admissions.

Students considering transferring to KU may see how their college-level course work will transfer on the Office of the University Registrar (<https://registrar.ku.edu/credittransfer/>) website.

First- and Second-Year Preparation

Because biology study requires preparation in other sciences, students should begin meeting major requirements in the first year. It is particularly important to take CHEM 130 and CHEM 135 in the first year and, for several majors, to take CHEM 330, CHEM 331, CHEM 335, and CHEM 336 in the second year. Ideally, most majors should also take BIOL 150 and BIOL 152 during the first year, as well as BIOL 105.

| Code | Title | Hours |
|-------------------------------------|--|-------|
| General Science Requirements | | |
| BIOL 105 | Biology Orientation Seminar | |
| BIOL 150 | Principles of Molecular and Cellular Biology | |
| or BIOL 151 | Principles of Molecular and Cellular Biology, Honors | |
| BIOL 152 | Principles of Organismal Biology | |
| or BIOL 153 | Principles of Organismal Biology, Honors | |
| BIOL 154 | Introductory Biology Lab for STEM Majors | |
| BIOL 350 | Principles of Genetics | |
| or BIOL 360 | Principles of Genetics, Honors | |
| CHEM 130 | General Chemistry I | |
| or CHEM 190 | Foundations of Chemistry I, Honors | |
| | and Foundations of Chemistry I Laboratory, Honors | |
| | & CHEM 191 | |
| CHEM 135 | General Chemistry II | |

or CHEM 190 Foundations of Chemistry II, Honors
and Foundations of Chemistry II Laboratory, Honors
& CHEM 191

CHEM 330 Organic Chemistry I

or CHEM 380 Organic Chemistry I, Honors

Choose one of the following:

MATH 115 Calculus I

MATH 125 Calculus I

MATH 145 Calculus I, Honors

Choose one of the following:

PHSX 114 College Physics I

PHSX 211 General Physics I
& PHSX 216 and General Physics I Laboratory

PHSX 213 General Physics I Honors

Ecology, Evolution, and Organismal Biology Requirements

| | | |
|---|-------------------------------|---|
| BIOL 370 | Introduction to Biostatistics | 4 |
| BIOL 412 | Evolutionary Biology | 4 |
| BIOL 413 | The Tree of Life | 4 |
| BIOL 414 | Principles of Ecology | 3 |
| BIOL 428 | Introduction to Systematics | 3 |
| Physiology of Organisms. Satisfied by one of the following: | | 3 |

BIOL 544 Comparative Animal Physiology

BIOL 546 Mammalian Physiology

BIOL 555 General Plant Physiology

BIOL 606 Ecological Plant Physiology

Microbiology/Cell Structure and Function/Biology of Development/
Biochemistry. Satisfied by one of the following:

BIOL 400 Fundamentals of Microbiology

BIOL 416 Cell Structure and Function

BIOL 417 Biology of Development

BIOL 600 Introductory Biochemistry, Lectures

Ecology, Evolution, and Organismal Biology Elective Hours 24

Satisfied by completing a total of 24 hours in the following, with no more than 5 credit hours in BIOL 423 Non-Lab Independent Study and/or BIOL 424 Independent Study (combined):

Biology Laboratory Electives

Satisfied by completing at least 4 hours of lab credit in biology courses numbered 400 or higher, CHEM 331 or CHEM 336. No more than 2 credit hours in BIOL 423 Non-Lab Independent Study and/or BIOL 424 Independent Study (combined) may be applied.

Biology Electives

Satisfied by completing additional biology courses numbered 400 or higher, CHEM 331, CHEM 335, CHEM 336, MATH 116, PHSX 115 or PHSX 212 & PHSX 236.

Biology Capstone Requirement

Satisfied by completing a BIOL Capstone course.

BIOL 405 Laboratory in Genetics

BIOL 423 Non-laboratory Independent Study (3 credit hours)

BIOL 424 Independent Study (3 credit hours)

BIOL 426 Laboratory in Cell Biology

BIOL 446 Biology of Sleep

BIOL 490 Internship and Practical Applications (3 credit hours)

BIOL 533 Biology of Fungi

| | | |
|--------------------|------------------------------------|-----------|
| BIOL 545 | Evolution of Development | |
| BIOL 599 | Senior Seminar: _____ | |
| BIOL 652 | Animal Behavior | |
| BIOL 655 | Behavioral Genetics | |
| BIOL 699 | Biology Honors Research Colloquium | |
| Total Hours | | 48 |

Major Hours & Major GPA

While completing all required courses, majors must also meet each of the following hour and grade-point average minimum standards:

Major Hours

Satisfied by 48 hours of major courses.

Major Hours in Residence

Satisfied by a minimum of 15 hours of KU resident credit in the major.

Major Junior/Senior Hours

Satisfied by a minimum of 41 hours from junior/senior courses (300+) in the major.

Major Junior/Senior Graduation GPA

Satisfied by a minimum of a 2.0 KU GPA in junior/senior courses (300+) in the major. GPA calculations include all junior/senior courses in the field of

study including F's and repeated courses. See the Semester/Cumulative GPA Calculator (<https://sis.ku.edu/gpa-calculator/>).

Below is a sample 4-year plan for students pursuing the BS in Ecology, Evolution, and Organismal Biology. To view the list of courses approved to fulfill Core 34, please visit the KU Core 34 page (<https://catalog.ku.edu/core34/>).

This degree plan assumes students will have the equivalent of MATH 101 or MATH 104 prior to the freshman year, fall semester.

Freshman

| Fall | Hours Spring | Hours |
|---|--|--------------|
| BIOL 150 or 152 (Core 34: Natural and Physical Sciences (SGE); General Science Requirement) ^{040***,2} | 3 BIOL 152 or 150 (General Science Requirement) ² | 3 |
| CHEM 130 (General Science Requirement) ¹ | 5 BIOL 154 (Core 34: Natural and Physical Sciences (SGE); General Science Requirement) ^{040***} | 2 |
| BIOL 105 (General Science Requirement) ⁷ | 1 CHEM 135 (General Science Requirement) | 5 |
| Core 34: English (SGE) ⁰¹⁰ | 3 MATH 115 or 125 (Core 34: Math and Statistics (SGE)) ^{030*,1} | 3-4 |
| Core 34: Communications (SGE) ⁰²⁰ | 3 Core 34: English (SGE) ⁰¹⁰ | 3 |
| 15 | | 16-17 |

Sophomore

| Fall | Hours Spring | Hours |
|---|---|-----------|
| BIOL 413 (Major Requirement) ⁵ | 4 BIOL 350 or 360 (General Science Requirement) | 4 |
| BIOL 370 (Major Requirement) | 4 Biology Elective (Major Requirement) ⁶ | 3 |
| CHEM 330 (General Science Requirement) ⁴ | 3 PHSX 114 (General Science Requirement) ⁹ | 4 |
| Core 34: Arts and Humanities (SGE) ⁰⁶⁰ | 3 Core 34: Social and Behavioral Science (SGE) ⁰⁵⁰ | 3 |
| Core 34: Social and Behavioral Science (SGE) ⁰⁵⁰ | 3 | |
| 17 | | 14 |

Junior

| Fall | Hours Spring | Hours |
|---|--|-----------|
| BIOL 414 (Major Requirement) ⁵ | 3 BIOL 412 (Major Requirement) ³ | 4 |
| BIOL 544, 546, 555, or 606 (Major Requirement) ^{3,5} | 3 BIOL 428 (Major Requirement) ³ | 3 |
| Core 34: US Culture (SGE) ⁰⁷⁰ | 3 BIOL 400, 416, 417, or 600 (Major Requirement) ³ | 3 |
| Biology Elective (Major Requirement) ⁶ | 3 Core 34: Global Culture (SGE) ⁰⁷⁰ | 3 |
| Biology Lab Elective (Major Requirement) ⁶ | 2 Second Area of Study/ Elective/Degree/Junior-Senior Hours ⁸ | 3 |
| 14 | | 16 |

Senior

| Fall | Hours Spring | Hours |
|--|--|-----------|
| BIOL Capstone Course ¹⁰ | 3 Biology Elective (Major Requirement) ⁶ | 3 |
| Biology Elective (Major Requirement) ⁶ | 3 Biology Elective (Major Requirement) ⁶ | 2 |
| Biology Elective (Major Requirement) ⁶ | 3 Core 34: Arts and Humanities (SGE) ⁰⁶⁰ | 3 |
| Biology Lab Elective (Major Requirement) ⁶ | 2 Second Area of Study/ Elective/Degree/Junior-Senior Hours ⁸ | 3 |
| Second Area of Study/ Elective/Degree/Junior-Senior Hours ⁸ | 3 Second Area of Study/ Elective/Degree/Junior-Senior Hours ⁸ | 3 |
| 14 | | 14 |

Total Hours 120-121

¹ MATH 115 and CHEM 130 require MATH ACT scores of 26+, a comparable SAT or KU Math Placement Exam score, or credit for a MATH 101 or MATH 104 equivalent course. MATH 125 requires MATH ACT score of 28+, comparable SAT or KU Math Placement Exam score, or credit in MATH 104.

² Concurrent or prior enrollment in CHEM 130 is required. BIOL 151 is the honors equivalent of BIOL 150 and offered in the fall semesters. BIOL 153 is the honors equivalent of BIOL 152 and offered in the spring semesters.

³ BIOL 412, BIOL 417, BIOL 428, and BIOL 546 are offered only in the spring.

- ⁴ Most medical schools require CHEM 330, CHEM 331, and CHEM 335.
- ⁵ BIOL 413, BIOL 414, and BIOL 544 are offered only in the fall.
- ⁶ Satisfied by a total of 24 credit hours. This includes at least 4 hours of lab credit in BIOL courses numbered 400 or higher, CHEM 331, or CHEM 336, and a BIOL Capstone course. The additional hours are satisfied by BIOL lecture or lab courses numbered 400 or higher or CHEM 331, CHEM 335, CHEM 336, MATH 116, PHSX 115 (or PHSX 212 & PHSX 236). No more than 5 hours of BIOL 423 and/or BIOL 424 can be applied towards elective requirement, with no more than 2 hours of BIOL 424 applied towards the lab requirement.
- ⁷ BIOL 105 Biology Orientation Seminar (1 hour online course) is required for the major. It can be taken the summer prior to your freshman year.
- ⁸ Hour requirements (incl. 45 jr/sr hrs) are typically met through Core 34, degree, major, second area of study and/or elective hours. Students completing the BGS with a major must choose a secondary area of study. Individual degree mapping is done in partnership with your advisor.
- ⁹ PHSX 211 & PHSX 216 together may be taken instead of PHSX 114 to fulfill this requirement.
- ¹⁰ BIOL Capstone courses currently include BIOL 405, BIOL 423 (3 credit hours), BIOL 424 (3 credit hours), BIOL 426, BIOL 446, BIOL 490 (3 credit hours), BIOL 533, BIOL 545, BIOL 599, BIOL 652, BIOL 655, and BIOL 699.

Please note:

Students may earn degrees in more than one major within biological sciences, or in a biological science and an area outside biology by meeting the requirements of both degree programs and taking at least 15 hours of courses unique to each major.

All students in the College of Liberal Arts and Sciences are required to complete 120 total hours of which 45 hours must be at the Jr/Sr (300+) level.

*Courses with a * designate courses that are degree requirements but can also be taken to fulfill the KU Core 34 requirement. If another course is used to fulfill the Core 34 requirement, the course listed is still required as a degree requirement.

Notes:

* - This course is a Required major course and is also part of Core 34: Systemwide General Education. If this course is not taken to fulfill the Core 34:SGE requirement, it must be taken in place of elective hours.

** - This course is a Recommended Core 34: Systemwide General Education course. This specific course is not required but is recommended by the program's faculty.

*** - This course is a Required Core 34: Systemwide General Education course. This program is approved by the Kansas Board of Regents to require this specific Core 34: Systemwide General Education course. If a student did not take this course it must be taken in addition to other degree requirements.

At the completion of this program, students will be able to:

- Explain the sources of genetic variation within populations, how variation is maintained or lost in populations and mechanisms of evolutionary change operating in populations and how these may lead to the formation of biological species. Use the principles of evolution to explain the diversity of life on Earth;

describe evidence that supports the conclusion that evolution explains the diversity of life on Earth.

- Describe how organisms inherit genetic information that influences the location, timing, and intensity of gene expression. Explain that cells/organs/organisms have multiple mechanisms to perceive and respond to changing environmental conditions.
- Describe how complex networks are formed by interactions at many biological scales (i.e., molecules, genes, cells, tissues, organs, individuals and ecosystems), and that organisms integrate internal and external information to respond to environmental changes.
- Explain that biological structures exist at all levels of organization, from molecules to ecosystems, and the physical and chemical characteristics of a structure influence its function.
- Apply the scientific method and communicate scientific arguments, ideas, and results clearly and explicitly through writing and speech. Demonstrate a knowledge of the ethical considerations related to scientific research.
- Apply quantitative reasoning, mathematical, statistical, and/or informatics tools to explain, evaluate, and effectively interpret claims, theories, and assumptions in the biological sciences.

Departmental Honors

Undergraduate majors are eligible to graduate with honors in biology if they fulfill the following requirements:

1. Complete all course work required for the appropriate degree in biology.
2. Achieve a minimum grade-point average of 3.5 in the major.
3. Complete BIOL 499 Introduction to Honors Research with a grade of B or higher, or complete two credits total of BIOL 423 and/or BIOL 424 with a grade of B or higher
4. Complete BIOL 699 Biology Honors Research Colloquium with a grade of B or higher.
5. Complete an independent research project under the supervision of a faculty member in an area appropriate to the degree sought.
6. Submit an honors thesis to the honors committee once the research is complete and present the results of the completed research at the honors research symposium.

Specific guidelines and intent forms are available in the Undergraduate Biology Program office and online (<http://www.kuub.ku.edu/>). Candidates must declare their intent to graduate with honors at least 2 semesters before graduation.

Study Abroad

Consult an advisor at least 4 months before undertaking study abroad. Consult the Office of Study Abroad (<http://www.studyabroad.ku.edu/>), 108 Lippincott Hall, for information about study in one of the many countries (e.g., Scotland, Australia, Switzerland) with special arrangements with KU.