Bachelor of Science in Biology

Why study biology?

Study biology because undergraduates should have the opportunity to explore the breadth of biology that allows them to succeed in their chosen paths beyond the university.

Undergraduate Admission

Admission to KU

All students applying for admission must send high school and college transcripts to the Office of Admissions. Unless they are college transfer students with at least 24 hours of credit, prospective students must send ACT or SAT scores 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 Office of International Student and Scholar 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 Admissions (http://credittransfer.ku.edu) website.

Admission to the College of Liberal Arts and Sciences

Admission to the College is a different process from admission to a major field. Some CLAS departments have admission requirements. See individual department/program sections for departmental admission requirements.

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. Students who have taken BIOL 100 and BIOL 102, have earned an A or B in both courses, and have decided to major in a biological science should consult a UBP advisor to request permission to substitute BIOL 100 and BIOL 102 for BIOL 150.

Admission to the Major

Admission Requirements

Course Requirements

<table>
<thead>
<tr>
<th>Admission course requirements for Biochemistry, Biology, and Human Biology (18)</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Biology Orientation Seminar. Satisfied by:</td>
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<tr>
<td>BIOL 105</td>
<td>Biology Orientation Seminar</td>
</tr>
<tr>
<td>Principles of Molecular and Cellular Biology. Satisfied by one of the following:</td>
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</tr>
<tr>
<td>BIOL 150</td>
<td>Principles of Molecular and Cellular Biology</td>
</tr>
<tr>
<td>or BIOL 151</td>
<td>Principles of Molecular and Cellular Biology, Honors</td>
</tr>
<tr>
<td>or BIOL 152</td>
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<td>or BIOL 153</td>
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<tr>
<td>Chemistry II. Satisfied by one of the following:</td>
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<tr>
<td>CHEM 135</td>
<td>General Chemistry II</td>
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<tr>
<td>or CHEM 175</td>
<td>Chemistry for the Chemical Sciences II</td>
</tr>
<tr>
<td>or CHEM 195</td>
<td>Foundations of Chemistry II, Honors</td>
</tr>
<tr>
<td>Principles of Genetics. Satisfied by one of the following:</td>
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<tr>
<td>BIOL 350</td>
<td>Principles of Genetics</td>
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<tr>
<td>or BIOL 360</td>
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Admission course requirements for Microbiology (14)

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<td>BIOL 350</td>
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Admission course requirements for Molecular Biosciences (Edwards campus) (17)

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<tr>
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<td>or BIOL 360</td>
<td>Principles of Genetics, Honors</td>
</tr>
</tbody>
</table>

Biochemistry, Biology, Human Biology, and Molecular Biosciences Admission GPA

Must have a grade-point average of at least 2.2 based on grades in BIOL 150, BIOL 152, CHEM 135, and BIOL 350 (or equivalents). KU's course repeat policy applies to grade-point average calculation.

Microbiology Admission GPA

Must have a grade-point average of at least 2.2 based on grades in BIOL 150, CHEM 135, and BIOL 350 (or equivalents). Microbiology admission requirements differ from those for Biochemistry, Biology, Human Biology, and Molecular Biosciences, because BIOL 152 is not
required for the B.A. and B.S. degrees in microbiology. KU’s course repeat policy applies to grade-point average calculation.

Application Term
Application to the major should occur in the term in which admission requirements will be completed. If the student does not meet established admission grade-point average criteria or neglects to apply for admission in this term, she or he must petition the Undergraduate Biology Program for permission for late application. The Undergraduate Biology Program, as part of an approved petition, determines late admission requirements (including grade-point average and course requirements) and the final deadline for admission.

Majors and Concentrations
Bachelor’s degree requirements in biology are modified as necessary. Current requirements are available in the UBP office and online (http://www.kubub.ku.edu). Major programs are offered in biochemistry, biology, human biology, and microbiology. Students may choose to concentrate in a range of specialties in the biological sciences, such as botany, cellular biology, developmental biology, environmental biology, ecology, entomology, genetics, marine biology, molecular biology, neurobiology, paleontology, physiology, systematics, or zoology (invertebrate or vertebrate).

Requirements for the B.S. Degree in Biology

General Education Requirements
In addition to degree and major requirements for all plans and subplans, all students must complete the KU Core.

Ecology, Evolution, and Organismal Biology

General Science Requirements (29-32)
Majors must complete the following general science requirements that serve as foundational courses for this major.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>BIOL 105</td>
<td>Biology Orientation Seminar</td>
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<tr>
<td>CHEM 130</td>
<td>General Chemistry I</td>
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<tr>
<td>CHEM 190</td>
<td>Foundations of Chemistry I, Honors</td>
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<tr>
<td>CHEM 135</td>
<td>General Chemistry II</td>
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</tr>
<tr>
<td>CHEM 195</td>
<td>Foundations of Chemistry II, Honors</td>
<td>5</td>
</tr>
<tr>
<td>CHEM 310</td>
<td>Fundamentals of Organic Chemistry</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 330</td>
<td>Organic Chemistry I</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 380</td>
<td>Organic Chemistry I, Honors</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 600</td>
<td>Introductory Biochemistry, Lectures</td>
<td>3</td>
</tr>
<tr>
<td>MATH 115</td>
<td>Calculus I</td>
<td>4-6</td>
</tr>
<tr>
<td>MATH 116</td>
<td>and Calculus II</td>
<td></td>
</tr>
<tr>
<td>MATH 125</td>
<td>Calculus I</td>
<td></td>
</tr>
<tr>
<td>MATH 145</td>
<td>Calculus I, Honors</td>
<td></td>
</tr>
<tr>
<td>MATH 150</td>
<td>Principles of Molecular and Cellular Biology</td>
<td>4</td>
</tr>
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<td>MATH 151</td>
<td>Principles of Molecular and Cellular Biology, Honors</td>
<td>4</td>
</tr>
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<td>Principles of Genetics</td>
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<td>MATH 360</td>
<td>Principles of Genetics, Honors</td>
<td>4</td>
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<tr>
<td>BIOL 408</td>
<td>Physiology of Organisms</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 412</td>
<td>Evolutionary Biology</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 413</td>
<td>History and Diversity of Organisms</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 428</td>
<td>Introduction to Systematics</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 599</td>
<td>Senior Seminar: _____ (in EEOB. Must be taken in senior year.)</td>
<td>1</td>
</tr>
</tbody>
</table>

Ecology, Evolution, and Organismal Biology Required Electives, Laboratory, and Seminar (18)
Satisfied by completing 18 hours of BIOL courses numbered 400 or higher, including at least 4 hrs of lab credit and 2 hrs of seminar/topics course (BIOL 419, BIOL 420, BIOL 499, BIOL 701). No more than 5 hrs of BIOL 423 Non-Lab Independent Study and/or BIOL 424 Independent Study (combined) can be applied to the elective requirement, with no more than 2 hrs of BIOL 424 being applied to the laboratory requirement. The Undergraduate Biology Program must approve exceptions to these elective requirements.

Laboratory. Satisfied by completing at least 4 hrs of laboratory courses. No more than 2 hrs of BIOL 424 can count toward lab requirement.
Seminar. Satisfied by completing at least 2 hours of the following seminar or topics course:
- BIOL 419  Topics in: _____
- BIOL 420  Seminar: _____
- BIOL 499  Introduction to Honors Research
- BIOL 701  Topics in: _____

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 47 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 12 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 (http://clas.ku.edu/undergrad/tools/gpa).

Molecular, Cellular, and Developmental Biology

**General Science Requirements (34-37)**
Majors must complete the following general science requirements that serve as foundational courses for this major.

**Biology Orientation Seminar.** Satisfied by one of the following:
- BIOL 105  Biology Orientation Seminar

**Chemistry I.** Satisfied by one of the following:
- CHEM 130  General Chemistry I
- CHEM 190  Foundations of Chemistry I, Honors

**Chemistry II.** Satisfied by one of the following:
- CHEM 135  General Chemistry II
- CHEM 195  Foundations of Chemistry II, Honors

**Organic Chemistry I.** Satisfied by one of the following:
- CHEM 330  Organic Chemistry I
- CHEM 380  Organic Chemistry I, Honors

**Organic Chemistry I Laboratory.** Satisfied by:
- CHEM 331  Organic Chemistry I Laboratory

**Organic Chemistry II.** Satisfied by one of the following:
- CHEM 335  Organic Chemistry II
- CHEM 385  Organic Chemistry II, Honors

**Calculus.** Satisfied by one of the following:
- MATH 115  Calculus I
- MATH 116  and Calculus II
- MATH 125  Calculus I
- MATH 145  Calculus I, Honors

**Statistics.** Satisfied by one of the following:
- BIOL 570  Introduction to Biostatistics
- MATH 365  Elementary Statistics

**Physics I.** Satisfied by 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

**Physics II.** Satisfied by one of the following:
- PHSX 115  College Physics II
- PHSX 212  General Physics II & PHSX 236  and General Physics II Laboratory
- PHSX 214  General Physics II Honors

**Molecular, Cellular, and Developmental Biology Requirements (34-35)**
Satisfied by completing courses below. These additional science courses are included in the MCDB major hours and GPA calculations.

**Principles of Molecular & Cellular Biology.** Satisfied by one of the following:
- BIOL 150  Principles of Molecular and Cellular Biology
- BIOL 151  Principles of Molecular and Cellular Biology, Honors

**Principles of Organismal Biology.** Satisfied by one of the following:
- BIOL 152  Principles of Organismal Biology
- BIOL 153  Principles of Organismal Biology, Honors

**Principles of Genetics.** Satisfied by one of the following:
- BIOL 350  Principles of Genetics
- BIOL 360  Principles of Genetics, Honors

**Evolutionary Biology.** Satisfied by:
- BIOL 412  Evolutionary Biology

**Laboratory in Genetics / Cell Biology.** Satisfied by one of the following:
- BIOL 405  Laboratory in Genetics
- BIOL 426  Laboratory in Cell Biology

**Cell Structure and Function.** Satisfied by:
- BIOL 416  Cell Structure and Function
- BIOL 536  Cell Structure and Function (Honors)

**Biology of Development.** Satisfied by:
- BIOL 417  Biology of Development

**Introduction to Neurobiology.** Satisfied by:
- BIOL 435  Introduction to Neurobiology

**Senior Seminar in MCDB.** Satisfied by:
- BIOL 599  Senior Seminar: _____ (in MCDB. Must be taken in senior year.)

**Introductory Biochemistry.** Satisfied by:
- BIOL 600  Introductory Biochemistry, Lectures

**Advanced Neurobiology / Gene Expression / Molec. Biology Cancer.** Satisfied by one of the following:
- BIOL 650  Advanced Neurobiology
- BIOL 672  Gene Expression
- BIOL 688  The Molecular Biology of Cancer

Molecular, Cellular, and Developmental Biology Required Electives (12)
Satisfied by 12 hrs of any BIOL courses numbered 400 or higher; 12 no more than 3 hrs of BIOL 423 Non-Lab Independent Study and/or BIOL 424 Independent Study (combined) can be used to fulfill the elective requirement.

**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 46 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 15 hours of KU resident credit 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.

**Teaching Biology**

**General Science Requirements (28-31)**

Majors must complete the following general science requirements that serve as foundational courses for this major.

**Biology Orientation Seminar. Satisfied by:**

- **BIOL 105** Biology Orientation Seminar 1

**Chemistry I. Satisfied by one of the following:**

- **CHEM 130** General Chemistry I 5
- **CHEM 190** Foundations of Chemistry I, Honors

**Chemistry II. Satisfied by one of the following:**

- **CHEM 135** General Chemistry II 5
- **CHEM 195** Foundations of Chemistry II, Honors

**Organic Chemistry I. Satisfied by one of the following:**

- **CHEM 310** Fundamentals of Organic Chemistry 3
- **CHEM 330** Organic Chemistry I
- **CHEM 380** Organic Chemistry I, Honors

**Organic Chemistry I Laboratory. Satisfied by:**

- **CHEM 331** Organic Chemistry I Laboratory 2

**Calculus. Satisfied by one of the following:**

- **MATH 115** Calculus I 4-6
  
  & **MATH 116** and Calculus II
- **MATH 125** Calculus I
- **MATH 145** Calculus I, Honors

**Physics I. Satisfied by one of the following:**

- **PHSX 114** College Physics I 4-5
- **PHSX 211** General Physics I
  
  & **PHSX 216** and General Physics I Laboratory
- **PHSX 213** General Physics I Honors

**Physics II. Satisfied by one of the following:**

- **PHSX 115** College Physics II 4
- **PHSX 212** General Physics II
  
  & **PHSX 236** and General Physics II Laboratory

**Teaching Biology Course Requirements (32)**

Satisfied by completing 32 hours of course work below.

**Principles of Molecular & Cellular Biology. Satisfied by one of the following:**

- **BIOL 150** Principles of Molecular and Cellular Biology 4
- **BIOL 151** Principles of Molecular and Cellular Biology, Honors

**Principles of Organismal Biology. Satisfied by one of the following:**

- **BIOL 152** Principles of Organismal Biology 4
- **BIOL 153** Principles of Organismal Biology, Honors

**Principles of Genetics. Satisfied by one of the following:**

- **BIOL 350** Principles of Genetics 4
- **BIOL 360** Principles of Genetics, Honors

**Evolutionary Biology. Satisfied by:**

- **BIOL 412** Evolutionary Biology 4

**Principles of Ecology. Satisfied by:**

- **BIOL 414** Principles of Ecology 3

**Cell Structure & Function. Satisfied by one of the following:**

- **BIOL 416** Cell Structure and Function 3
- **BIOL 536** Cell Structure and Function (Honors)

**Research Methods. Satisfied by:**

- **BIOL 598** Research Methods 3

**Senior Seminar. Satisfied by:**

- **BIOL 599** Senior Seminar: _____ (must be taken in senior year) 1

**Teaching Biology Required Electives and Laboratory (7)**

Satisfied by 7 hours of BIOL courses numbered 400 or higher which include at least 4 hours of laboratory credit. Courses listed above which have not been used to fulfill the above requirements may be used as electives. No more than 3 hours of BIOL 423 Non-Lab Independent Study and/or BIOL 424 Independent Study (combined) can be applied towards the elective requirement with no more than 2 hours of BIOL 424 being applied towards the laboratory requirement.

**Laboratory. Satisfied by completing a minimum of 4 hours of biology laboratory courses numbered 400 or higher. Some course limits apply, including no more than 2 hours of BIOL 423/BIO 424 allowed toward Lab requirement.**

**Teaching Biology Elective. Satisfied by completing a minimum of 3 hours of BIOL courses numbered 400 or higher. No more than 3 hours of BIOL 423/BIO 424 allowed toward Elective requirement.**

**Teaching Biology Education Requirements (16-25)**

Students who are seeking classroom certification must complete the following requirements through the School of Education.

**Approaches to Teaching Science and Mathematics I. Satisfied by:**

- **LA&S 290** Approaches to Teaching Science and Mathematics 1
Approaches to Teaching Science and Mathematics II. Satisfied by:
LA&S 291 Approaches to Teaching Science and Mathematics II
Knowing and Learning in Mathematics & Science. Satisfied by:
C&T 360 Knowing and Learning in Mathematics and Science
Classroom Interactions in Mathematics and Science. Satisfied by:
C&T 366 Classroom Interactions in Mathematics and Science
Reading and Writing Across the Curriculum. Satisfied by:
C&T 448 Reading and Writing Across the Curriculum
Project-Based Instruction in Mathematics & Science. Satisfied by:
C&T 460 Project Based Instruction in Mathematics and Science
Student Teaching. Satisfied by:
C&T 500 Student Teaching in: _____
Special Topics Seminar. Satisfied by:
C&T 598 Special Course: _____

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 a minimum of 39 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 12 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 (http://clas.ku.edu/undergrad/tools/gpa).

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 3.25 overall and 3.5 in the major.
3. Complete BIOL 499 Introduction to Honors Research 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.

Students majoring in Human Biology with Anthropology, Applied Behavioral Science, Psychology, or Speech-Language-Hearing concentrations will follow the honors requirements for their respective concentration department.

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.