BIOLOGY | INTEGRATIVE BIOLOGY

The biology majors combine the faculty and resources of the College of Agricultural and Life Sciences and the College of Liberal Arts and Sciences to prepare undergraduates for careers in the biological sciences, advanced study in professional and graduate schools, productive citizenship and leadership, and lifelong learning. The program is comprehensive and flexible, emphasizing the diverse forms, processes, and systems of life. Students in the program complete required and elective courses that promote critical thinking through the investigation and understanding of principles and unifying themes that govern living systems. The biology major offers a broader approach to biology than is available through a major in botany, zoology, or other specialized biological sciences majors.

About this Program

- **College:** Liberal Arts and Sciences
- **Degrees:** Bachelor of Arts | B.S.: Integrative Biology | B.S.: Preprofessional Biology
- **Credits for Degree:** 120
- **Additional Information**
- **Related Biology Programs**

To graduate with this major, students must complete all university, college, and major requirements.

The biology degrees develop fundamental knowledge of animals, plants and microorganisms. The degrees and specializations are tailored to meet the needs of preprofessional students, those students preparing for graduate studies in biology or specialized areas, and those seeking careers in education, the allied health professions and interdisciplinary fields such as environmental or biotechnology law, science journalism, and bioscience management.

The CLAS Bachelor of Science in biology offers two specializations. The Bachelor of Science: Integrative Biology is designed for students preparing for graduate studies in biology or specialized areas such as ecology, evolution, genetics, molecular biology, physiology, and systematics. The Bachelor of Science: Preprofessional Biology is designed for students preparing for admission to medical, dental, optometry, veterinary, or other professional schools.

The CLAS Bachelor of Arts in biology is a flexible degree that is best suited for students interested in a career in education, the allied health professions, and interdisciplinary fields such as environmental or biotechnology law, science journalism, and bioscience management.

Coursework for the Majors

The B.S. biology specializations require significant introductory coursework and credits in general biology, calculus and/or statistics, general chemistry, organic chemistry, and physics. The B.A. requires less preparation in mathematics, chemistry and physics. Students who are uncertain about the program that best suits their goals should consult a biology advisor for information and curriculum planning. Students can also individualize their curricula with additional life science courses from other departments, colleges and units at UF.

### Relevant Minors and/or Certificates

**UFTeach Program**

More Info

There is a severe shortage of qualified secondary school biology teachers in Florida and nationwide. Students interested in becoming part of this high demand profession should see a biology advisor or the UFTeach advisor. UFTeach students complete the UFTeach minor in science teaching with their B.A. or B.S. in biology and have the coursework and preparation for professional teacher certification in Florida when they graduate.

**Research**

More Info

All biology majors are encouraged to participate in research. Research experience is valuable on many levels: it diversifies the college experience, teaches how scientists apply the knowledge gained in the classroom to real world questions, provides the opportunity to work with and to get to know researchers who are the best in their field, enables participation in cutting edge scientific questions and techniques, enhances the student’s resume/CV when applying to graduate or professional school and, finally, it is essential to help the student determine if science is an appropriate career choice.

CLAS biology majors may participate in research for course credit, as a scholar (e.g., University Scholar), as a volunteer, or, in rare cases, as a paid research assistant.

**Related Biology Programs**

- Bachelor of Science in Biology, CALS
- Bachelor of Arts in Biology, UF Online

**Bachelor of Science | Integrative Biology**

The B.S. | Integrative Biology specialization is designed for students seeking admission to graduate school in biology or specialized areas such as ecology, evolution, genetics, molecular biology, physiology, and systematics.

All coursework for the major must be completed with minimum grades of C.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSC 2010</td>
<td>Integrated Principles of Biology 1 and Integrated Principles of Biology Laboratory 1</td>
<td>4</td>
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<tr>
<td>&amp; 2010L</td>
<td>&amp; 2010L</td>
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<tr>
<td>BSC 2011</td>
<td>Integrated Principles of Biology 2 and Integrated Principles of Biology Laboratory 2</td>
<td>4</td>
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<tr>
<td>&amp; 2011L</td>
<td>&amp; 2011L</td>
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<tr>
<td>CHM 2045</td>
<td>General Chemistry 1 and General Chemistry 1 Laboratory</td>
<td>4</td>
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<tr>
<td>&amp; 2045L</td>
<td>&amp; 2045L</td>
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</tr>
<tr>
<td>CHM 2046</td>
<td>General Chemistry 2 and General Chemistry 2 Laboratory</td>
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<td>&amp; 2046L</td>
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<td>Organic Chemistry 1</td>
<td>3</td>
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<td>&amp; 2210L</td>
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<tr>
<td>MAC 2311</td>
<td>Analytic Geometry and Calculus 1</td>
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<td>or STA 2023</td>
<td>Introduction to Statistics 1</td>
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<tr>
<td>MAC 2312</td>
<td>Analytic Geometry and Calculus 2</td>
<td>3-4</td>
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Select one of the following options: 8-10

Option A:
- PHY 2053 & 2053L: Physics 1 and Laboratory for Physics 1
- PHY 2054 & 2054L: Physics 2 and Laboratory for Physics 2

Option B:
- PHY 2048 & 2048L: Physics with Calculus 1 and Laboratory for Physics with Calculus 1
- PHY 2049 & 2049L: Physics with Calculus 2 and Laboratory for Physics with Calculus 2

Required Core Coursework

- BSC 4936: Critical Analysis of Biological Research 2
- PCB 4674: Evolution 4

Select one of the following: 3-4

- PCB 3063: Genetics
- AGR 3303: Genetics
- PCB 4522: Molecular Genetics
- PCB 4043C: General Ecology 4

Select one of the following: 4-5

- BOT 3503 & 3503L: Physiology and Molecular Biology of Plants and Physiology and Molecular Biology of Plants Laboratory
- PCB 3713C: Cellular and Systems Physiology
- PCB 4723C: Physiology and Molecular Biology of Animals

Select one of the following: 3-4

- PCB 3134: Eukaryotic Cell Structure and Function
- ZOO 3713C: Functional Vertebrate Anatomy
- ZOO 3603C: Evolutionary Developmental Biology

Taxonomic Diversity. Select at least one course from two of the following three groups: 7-8

- Animal Diversity
  - ZOO 4205C: Invertebrate Biodiversity
  - or ZOO 4307C Vertebrate Biodiversity
- Plant and Fungal Diversity
  - BOT 2011C: Plant Diversity
  - or BOT 2710C Practical Plant Taxonomy
- Microorganisms and Microbial Diversity
  - MCB 3020: Basic Biology of Microorganisms
  - & 3020L: and Laboratory for Basic Biology of Microorganisms

Total Credits 66-73

1 This degree requires a minimum of 27 credits in core courses.

Critical Tracking

Critical Tracking records each student's progress in courses that are required for entry to each major. Please note the critical-tracking requirements below on a per-semester basis.

For degree requirements outside of the major, refer to CLAS Degree Requirements: Structure of a CLAS Degree.

Equivalent critical-tracking courses as determined by the State of Florida Common Course Prerequisites may be used for transfer students.

Semester 1
- Complete one of the following in BSC, CHM or MAC:
  - BSC 2010/BSC 2010L; CHM 1025 or CHM 2045/CHM 2045L;
  - MAC 1140, MAC 1114, MAC 1147 or MAC 2311
  - 2.0 UF GPA required

Semester 2
- Complete CHM 2045/CHM 2045L; and BSC 2010/BSC 2010L or MAC 2311
  - 2.0 UF GPA required

Semester 3
- Complete BSC 2010/BSC 2010L and MAC 2311 with a 2.5 GPA required for all critical-tracking courses
  - 2.0 UF GPA required

Semester 4
- Complete CHM 2046/CHM 2046L and BSC 2011/BSC 2011L with a 2.5 GPA required for all critical-tracking courses
  - 2.0 UF GPA required

Semester 5
- Complete CHM 2210 with a 2.5 GPA required for all critical-tracking courses
  - 2.0 UF GPA required

Model Semester Plan

Students are expected to complete the writing requirement while in the process of taking the courses below. Students are also expected to complete the general education international (GE-N) and diversity (GE-D) requirements concurrently with another general education requirement (typically, GE-C, H or S).

To remain on track, students must complete the appropriate critical-tracking courses, which appear in bold. These courses must be completed by the terms as listed above in the Critical Tracking criteria.

This semester plan represents an example progression through the major. Actual courses and course order may be different depending on the student's academic record and scheduling availability of courses. Prerequisites still apply.
### Fall Courses

<table>
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<tr>
<th>Semester</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tr>
<td>2</td>
<td>STA 2023</td>
<td>Introduction to Statistics 1 (Gen Ed Mathematics)</td>
<td>3</td>
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<tr>
<td>5</td>
<td>PCB 3713C</td>
<td>Cellular and Systems Physiology</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>PCB 4723C</td>
<td>Physiology and Molecular Biology of Animals</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>BSC 4936</td>
<td>Critical Analysis of Biological Research</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>PHY 2048</td>
<td>Physics with Calculus 1</td>
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<td>6</td>
<td>PHY 2048L</td>
<td>Laboratory for Physics with Calculus 1</td>
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<td>6</td>
<td>Electives (3000 level or above, not in major)</td>
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<td>3-4</td>
</tr>
<tr>
<td>7</td>
<td>PCB 3134</td>
<td>Eukaryotic Cell Structure and Function</td>
<td>3-4</td>
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<tr>
<td>7</td>
<td>ZOO 3603C</td>
<td>Evolutionary Developmental Biology</td>
<td>3-4</td>
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<tr>
<td>7</td>
<td>ZOO 3713C</td>
<td>Functional Vertebrate Anatomy</td>
<td>3-4</td>
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### Spring Courses

<table>
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<th>Semester</th>
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<th>Course Title</th>
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<tr>
<td>3</td>
<td>CHM 3217</td>
<td>Organic Chemistry/Biochemistry 1 (Critical Tracking)</td>
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<td>4</td>
<td>CHM 3210</td>
<td>Organic Chemistry 1 (Critical Tracking)</td>
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<td>6</td>
<td>Electives (3000 level or above, not in major)</td>
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<td>3-4</td>
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</table>

### Total Credits

120

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1. Select CHM 2211 if CHM 2210 was taken previously.

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### Before Graduating Students Must

- Achieve a passing score for all content subsections of the Major Field Test for Biology. Content subarea scores are molecular biology and genetics, organismal biology, evolution, ecology and population biology.
- Achieve a passing score on the analytical skills assessment indicator of the Major Field Test for Biology.
- Achieve a passing score on the bioethics module quiz in BSC 4936. The content of the module and quiz are reviewed and approved by a faculty committee.
- Achieve a passing score on the scientific literacy paper assignment given in BSC 4936. This paper is graded using a faculty-developed rubric.
- Complete requirements for the baccalaureate degree, as determined by faculty.

### Students in the Major Will Learn to

### Student Learning Outcomes (SLOs)

#### Content

1. Identify, describe and explain the basic terminology, concepts, methodologies and theories used within the biological sciences.

#### Critical Thinking

2. Analyze biological information and develop reasoned solutions to problems using the processes and applications of scientific inquiry.
3. Discriminate ethical behavior from unethical behavior in scientific research.

**Communication**
4. Communicate knowledge, ideas and reasoning clearly and effectively in written or oral forms appropriate to the biological sciences.

**Curriculum Map**

*I = Introduced; R = Reinforced; A = Assessed*

<table>
<thead>
<tr>
<th>Courses</th>
<th>SLO 1</th>
<th>SLO 2</th>
<th>SLO 3</th>
<th>SLO 4</th>
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<tr>
<td>AGR 3303 or PCB 3063 or PCB 4522</td>
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<td>ANS 3319C or R</td>
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<td>BOT 3503 or HOS 4304 or PCB 3713C or PCB 4723C</td>
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<td></td>
<td>R</td>
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<td>BSC 1920</td>
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<td>BSC 2010</td>
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<td>BSC 2011</td>
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<td>I</td>
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<td>A</td>
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<tr>
<td>MCB 3020</td>
<td>R</td>
<td>R</td>
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<td>and MCB 3020L, or PCB 3134 or PCB 4674</td>
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**Assessment Types**
- Major field test for biology
- Bioethics module
- Scientific literacy paper