BIOLOGY | APPLIED BIOLOGY

This program provides a broad, general overview of the structure, function, growth, origin, evolution, and distribution of living organisms. Biology students take courses in biology, chemistry, physics, calculus, and statistics. The major is flexible and combines the faculty and resources of two UF colleges to prepare students for career success.

About this Program

- **College**: Agricultural and Life Sciences (http://catalog.ufl.edu/UGRD/colleges-schools/UGAGL)
- **Degree**: Bachelor of Science
- **Credits for Degree**: 120
- **Additional Information**

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

The biology major develops fundamental knowledge of animals, plants and microorganisms. The four specializations offered by the College of Agricultural and Life Sciences are tailored to meet the needs of preprofessional students, those preparing for graduate studies in biology or specialized areas such as bioinformatics, ecology, genetics and molecular biology and those seeking a career in biotechnology, education, natural resource management and environmental or biotechnology law.

Coursework for the Major

College of Agricultural and Life Sciences (CALS) students in the biology major choose one of four specializations: applied biology, biotechnology, natural science or preprofessional biology. These specializations require significant introductory coursework and credits in general biology, calculus and/or statistics, general chemistry, organic chemistry and physics. Students who are uncertain about which specialization to choose should consult a biology advisor for information and guidance on curriculum planning. Students can individualize their curriculum through approved specialization electives in the life sciences.

Applied Biology

For students interested in learning how fundamental biology is applied to solving problems. This specialization provides exposure to the major issues facing sustainability of human populations and natural resources.

Biotechnology

Prepares students for careers where knowledge of molecular biology and genetic engineering are important. Students will have the opportunity to learn various techniques and scientific procedures in molecular biology, virology, bioengineering, cell and tissue culture and bioinformatics.

Natural Science

For students interested in descriptive and interpretive biology, with an emphasis on field biology. The specialization provides exposure to the major forms of flora and fauna, and integrates some of the major elements that influence flora and fauna, namely soil/water relations and human activities.

Preprofessional

For students preparing for admission to medical, dental, optometry, veterinary or other professional schools.

Relevant Minors and/or Certificates

**UFTeach Program**

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.S. in biology and have the coursework and preparation for professional teacher certification in Florida when they graduate.

More Info (http://education.ufl.edu/uf-teach)

**Bioinformatics**

Bioinformatics skills are valuable for students who may seek careers which will necessitate the analysis of genomic data. This minor provides students the opportunity to learn programming skills, mine genomic data, and participate in independent research.

Research

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 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.

More Info (http://major.biology.ufl.edu/do-research)

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

**Related Biology Programs**

- Bachelor of Arts or Bachelor of Science in Biology, CLAS (http://catalog.ufl.edu/UGRD/colleges-schools/UGLAS/BIO_BA_BS)
- Bachelor of Arts in Biology, UF Online (http://catalog.ufl.edu/UGRD/colleges-schools/UGLAS/BIO_BA_UFO)

**Applied Biology**

For students who are interested in learning how fundamental biology is applied to solving problems. This specialization provides exposure to the major issues facing sustainability of human populations and natural resources. This specialization prepares students for graduate study in the biological sciences.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSC 2010 &amp; 2010L</td>
<td>Integrated Principles of Biology 1 and Integrated Principles of Biology Laboratory 1</td>
<td>4</td>
</tr>
</tbody>
</table>

Select one: 4
Florida Common Course Prerequisites

Equivalent critical-tracking courses as determined by the State of Florida Common Course Prerequisites (http://www.flvc.org/cpp/displayRecord.jsp?cip=260101&track=01) may be used for transfer students.

### Semester 1
- Complete CHM 2045/CHM 2045L or MAC 2311
- 2.5 GPA required for all critical-tracking courses
- 2.0 UF GPA required

### Semester 2
- Complete CHM 2045/CHM 2045L and MAC 2311
- 2.5 GPA required for all critical-tracking courses
- 2.0 UF GPA required

### Semester 3
- Complete BSC 2010/BSC 2010L and CHM 2046/CHM 2046L
- 2.5 GPA required for all critical-tracking courses
- 2.0 UF GPA required

### Semester 4
- Complete BSC 2011/BSC 2011L
- 2.5 GPA required for all critical-tracking courses
- 2.0 UF GPA required

### Semester 5
- Complete all critical-tracking courses, including labs
- 2.5 GPA required for all critical-tracking courses
- 2.0 UF GPA required

### Model Semester Plan

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.

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>CHM 2045 &amp; 2045L</td>
<td>General Chemistry 1 and General Chemistry 1 Laboratory (Critical Tracking: State Core Gen Ed Biological and Physical Sciences)</td>
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<td>IDS 1161</td>
<td>What is the Good Life (Gen Ed Humanities)</td>
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<tr>
<td>State Core Gen Ed Composition (<a href="http://catalog.ufl.edu/UGRD/academic-programs/general-education/#genedcoursestext">http://catalog.ufl.edu/UGRD/academic-programs/general-education/#genedcoursestext</a>)</td>
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<tr>
<td>Elective</td>
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<tr>
<td>State Core Gen Ed Social and Behavioral Sciences (<a href="http://catalog.ufl.edu/UGRD/academic-programs/general-education/#genedcoursestext">http://catalog.ufl.edu/UGRD/academic-programs/general-education/#genedcoursestext</a>)</td>
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<td>3</td>
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<tr>
<td>Total Credits</td>
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<td>72-79</td>
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</table>

### 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.

Equivalent critical-tracking courses as determined by the State of Florida Common Course Prerequisites (http://www.flvc.org/cpp/displayRecord.jsp?cip=260101&track=01) may be used for transfer students.
Biology | Applied Biology

ECO 2023 Principles of Microeconomics (Gen Ed Social and Behavioral Sciences)

CHM 2046 General Chemistry 2 4
& 2046L and General Chemistry 2 Laboratory (Critical Tracking; Gen Ed Biological Sciences and Physical Sciences)

MAC 2311 Analytic Geometry and Calculus 1 (Critical Tracking; State Core Gen Ed Mathematics) 4

State Core Gen Ed Humanities (http://catalog.ufl.edu/UGRD/academic-programs/general-education/#genedcoursestext) 3

Credits 14-15

Semester Three

BSC 2010 Integrated Principles of Biology 1 4
& 2010L and Integrated Principles of Biology Laboratory 1 (Critical Tracking; Gen Ed Biological Sciences and Physical Sciences)

Select one: 3-4

STA 2023 Introduction to Statistics 1 (Gen Ed Mathematics )

MAC 2312 Analytic Geometry and Calculus 2 (Gen Ed Mathematics )

Gen Ed Composition: Writing Requirement 3

Electives 5

Credits 15-16

Semester Four

AEC 3030C Effective Oral Communication 3
or SPC 2608 or Introduction to Public Speaking

Select one: 4

BSC 2011 Integrated Principles of Biology 2
& 2011L and Integrated Principles of Biology Laboratory 2 (Critical Tracking)

BOT 2011C Plant Diversity (Critical Tracking)

Select one: 3-4

CHM 2210 Organic Chemistry 1
CHM 2200 Fundamentals of Organic Chemistry
& 2200L and Fundamentals of Organic Chemistry Laboratory

Applied biology course 3

Elective 3

Semester Five

CHM 2211 Organic Chemistry 2 5
& 2211L and Organic Chemistry Laboratory 1

Select one: 3-4

PHY 2004 Applied Physics 1
PHY 2053 Physics 1
PHY 2048 Physics with Calculus 1

Select one: 1

PHY 2004L Laboratory for Applied Physics 1
PHY 2053L Laboratory for Physics 1
PHY 2048L Laboratory for Physics with Calculus 1

Applied biology courses 6

Credits 16-17

Semester Six

BCH 3025 Fundamentals of Biochemistry 4
or BCH 4024 or Introduction to Biochemistry and Molecular Biology

Select one: 3-4

PHY 2005 Applied Physics 2
PHY 2054 Physics 2
PHY 2049 Physics with Calculus 2

Select one: 1

PHY 2005L Laboratory for Applied Physics 2
PHY 2054L Laboratory for Physics 2
PHY 2049L Laboratory for Physics with Calculus 2

Applied biology courses 3

Elective 3

Credits 14-15

Semester Seven

AGR 3303 Genetics 3-4
or PCB 3063 or Genetics

MCB 3020 Basic Biology of Microorganisms 4
& 3020L and Laboratory for Basic Biology of Microorganisms

Applied biology courses 6

Elective 3

Credits 16-17

Semester Eight

AEC 3033C Research and Business Writing in Agricultural and Life Sciences (Writing Requirement) 3

Select one: 3-4

ANS 3319C Reproductive Physiology and Endocrinology in Domestic Animals

BOT 3503 Physiology and Molecular Biology of Plants
HOS 4304 Horticultural Physiology
BSC 4936 Critical Analysis of Biological Research 2

Applied biology course 3

Electives 4

Credits 15-16

Total Credits 120

1 Not required if CHM 2200 and CHM 2200L were taken.

Academic Learning Compact

Biology is the study of the many diverse forms, processes and systems of life. These studies range across all levels of the biological hierarchy, from the simplest to the most complex life forms, across all environments on the earth and across recent and evolutionary time that interconnects ancestors to their descendants.

To understand this vast diversity, the field of biology correspondingly relies on integrative and comparative approaches for the resolution of the general processes, principles and unifying themes that govern living systems. Biology is therefore very interdisciplinary and biologists rely on knowledge from the physical sciences and mathematics, as well as from across the disciplines and subdisciplines of biology for advances and breakthroughs.

The biology major is administered jointly by the College of Agricultural and Life Sciences and the College of Liberal Arts and Sciences.

Before Graduating Students Must

- Achieve a passing score for all content subsections of the Major Field Test for Biology. Content subscore areas 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 for All Specializations except CALS Biotechnology**

*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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<td>ANS 3319C or R</td>
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<tr>
<td>BOT 3503 or HOS 4304 or PCB 3713C or PCB 4723C</td>
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<td>BSC 4936</td>
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<td>MCB 3020 and 3020L, or PCB 3134 or PCB 4674</td>
<td>R</td>
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**Assessment Types**
- Major field test for biology
- Bioethics module
- Scientific literacy paper

**Curriculum Map for CALS Biotechnology**

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<tr>
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<tr>
<td>BSC 2010</td>
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