

APPLIED BIOLOGY

Biology 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
- **Specializations:** Applied Biology (p. 1) | Biotechnology (http://catalog.ufl.edu/UGRD/colleges-schools/UGAGL/BLY_BS/BLY_BS02/) | Natural Science (http://catalog.ufl.edu/UGRD/colleges-schools/UGAGL/BLY_BS/BLY_BS03/) | Preprofessional (http://catalog.ufl.edu/UGRD/colleges-schools/UGAGL/BLY_BS/BLY_BS04/)
- **Credits for Degree:** 120
- **More Info**

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

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.

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 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 BS 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.

Code	Title	Credits
Required Foundation Coursework		
BSC 2010 & 2010L	Integrated Principles of Biology 1 and Integrated Principles of Biology Laboratory 1	4
Select one:		4
BSC 2011 & 2011L	Integrated Principles of Biology 2 and Integrated Principles of Biology Laboratory 2	
BOT 2011C	Plant Diversity	
CHM 2045 & 2045L	General Chemistry 1 and General Chemistry 1 Laboratory	4
CHM 2046 & 2046L	General Chemistry 2 and General Chemistry 2 Laboratory	4
Select one:		4-8
CHM 2200 & 2200L	Fundamentals of Organic Chemistry and Fundamentals of Organic Chemistry Laboratory	
CHM 2210 & CHM 2211 & CHM 2211L	Organic Chemistry 1 and Organic Chemistry 2 and Organic Chemistry Laboratory	
MAC 2311	Analytic Geometry and Calculus 1	4
STA 2023 or MAC 2312	Introduction to Statistics 1 Analytic Geometry and Calculus 2	3
Select one option:		8-10
Option A		
PHY 2004 & 2004L	Applied Physics 1 and Laboratory for Applied Physics 1	
PHY 2005 & 2005L	Applied Physics 2 and Laboratory for Applied Physics 2	
Option B		
PHY 2053 & 2053L	Physics 1 and Laboratory for Physics 1	
PHY 2054 & 2054L	Physics 2 and Laboratory for Physics 2	
Option C		
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		
AGR 3303 or PCB 3063	Genetics Genetics	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	
MCB 3020 & 3020L	Basic Biology of Microorganisms and Laboratory for Basic Biology of Microorganisms	4
BCH 3025 or BCH 4024	Fundamentals of Biochemistry Introduction to Biochemistry and Molecular Biology	4
BSC 4936	Critical Analysis of Biological Research	2

Approved applied biology courses (minimum)	21
Total Credits	72-79

Critical Tracking

Critical Tracking records each student's progress in courses that are required for progress toward 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 (<https://cpm.flvc.org/advance-search/>) 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 upper division GPA required
- 2.0 UF GPA required

Semester 6

- Complete a minimum of 2 of the remaining Applied Biology 3xxx/4xxx required core courses
- 2.0 upper division GPA required
- 2.0 UF GPA required

Semester 7

- Complete a minimum of 2 of the remaining Applied Biology 3xxx/4xxx required core courses
- 2.0 upper division GPA required
- 2.0 UF GPA required

Semester 8

- Complete all the remaining Applied Biology 3xxx/4xxx required core courses
- Complete BSC 4936 (Capstone)
- Complete all critical-tracking courses, including labs
- 2.0 upper division GPA required
- 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.

Course	Title	Credits
Semester One		
Quest 1 (Gen Ed Humanities)		3
CHM 2045 & 2045L	General Chemistry 1 and General Chemistry 1 Laboratory (Critical Tracking ; State Core Gen Ed Biological and Physical Sciences)	4
State Core Gen Ed Composition (http://catalog.ufl.edu/UGRD/academic-programs/general-education/#genedcoursestext)		3
State Core Gen Ed Social and Behavioral Sciences (http://catalog.ufl.edu/UGRD/academic-programs/general-education/#genedcoursestext)		3
Elective		2
Credits		15
Semester Two		
Select one:		3-4
AEB 2014	Economic Issues, Food and You (Gen Ed Social and Behavioral Sciences)	
AEB 3103	Principles of Food and Resource Economics (Gen Ed Social and Behavioral Sciences)	
ECO 2013	Principles of Macroeconomics (Gen Ed Social and Behavioral Sciences)	
ECO 2023	Principles of Microeconomics (Gen Ed Social and Behavioral Sciences)	
CHM 2046 & 2046L	General Chemistry 2 and General Chemistry 2 Laboratory (Critical Tracking ; Gen Ed Biological Sciences and Physical Sciences)	4
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 & 2010L	Integrated Principles of Biology 1 and Integrated Principles of Biology Laboratory 1 (Critical Tracking ; Gen Ed Biological Sciences and Physical Sciences)	4
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		
Quest 2		3
AEC 3030C or SPC 2608	Effective Oral Communication or Introduction to Public Speaking	3
Select one:		4
BSC 2011 & 2011L	Integrated Principles of Biology 2 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 & 2200L	Fundamentals of Organic Chemistry and Fundamentals of Organic Chemistry Laboratory	
Applied biology course		3
Credits		16-17
Semester Five		
CHM 2211 & 2211L	Organic Chemistry 2 and Organic Chemistry Laboratory ¹	5
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	15-16
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 course		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 (Critical Tracking)	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

Courses	SLO 1	SLO 2	SLO 3	SLO 4
AGR 3303 or PCB 3063 or PCB 4522	R	R		R
ANS 3319C or BOT 3503 or HOS 4304 or PCB 3713C or PCB 4723C	R	R		R
BSC 1920	I		I	I
BSC 2010	I	I	I	
BSC 2011	I	I	I	
BSC 4936	A	A	A	A
MCB 3020 and 3020L, or PCB 3134 or PCB 4674	R	R		R

Assessment Types

- Major field test for biology
- Bioethics module
- Scientific literacy paper

Curriculum Map for CALS Biotechnology

I = Introduced; R = Reinforced; A = Assessed

Courses	SLO 1	SLO 2	SLO 3	SLO 4
AGR 3303 or PCB 3063 or PCB 4522	R	R		
BSC 1920	I		I	I
BSC 2010	I	I	I	
BSC 2011	I	I	I	
BSC 4936	A	A	A	A
MCB 3020 and 3020L, or PCB 3134 or PCB 4674	R	R		R

Assessment Types

- Major field test for biology
- Bioethics module
- Scientific literacy paper

