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 (http://catalog.ufl.edu/UGRD/colleges-schools/UGLAS/)
- **Degrees:** Bachelor of Arts (http://catalog.ufl.edu/UGRD/colleges-schools/UGLAS/BIO_BA_BS/BIO_BA/) | Bachelor of Science
- **Specializations:** Integrative Biology (BS) (p. 1) | Preprofessional Biology (BS) (http://catalog.ufl.edu/UGRD/colleges-schools/UGLAS/BIO_BA_BS/BIO_BS04/)
- **Credits for Degree:** 120
- **More Info**

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

Department Information

The Department of Biology studies life at all levels from molecules to the biosphere to understand the evolution, structure, maintenance and dynamics of biological systems. The department's teaching and research provide the integrative and conceptual foundations of the life sciences.
Website (https://biology.ufl.edu/)

CONTACT

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Map (http://campusmap.ufl.edu/#/index/0747)

Curriculum

- Biology UF Online
- Biology | CALS
- Biology | CLAS
- Botany Minor
- Botany | CALS
- Botany | CLAS
- Combination Degrees
- Zoology
- Zoology Minor

The BS | 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.

Required major Coursework

Code	Title	Credits
Required Foundation Coursework		
BSC 2010 & 2010L	Integrated Principles of Biology 1 and Integrated Principles of Biology Laboratory	4
BSC 2011 & 2011L	Integrated Principles of Biology 2 and Integrated Principles of Biology Laboratory 2	4
CHM 2045 & 2045L	General Chemistry 1 and General Chemistry Laboratory	4
CHM 2046 & 2046L	General Chemistry 2 and General Chemistry 2 Laboratory	4
CHM 2210	Organic Chemistry 1	3

CHM 2211	Organic Chemistry 2	5
& 2211L	and Organic Chemistry Laboratory	
MAC 2311	Analytic Geometry and Calculus 1	4
MAC 2312	Analytic Geometry and Calculus 2	3-4
or STA 2023	Introduction to Statistics 1	
Select one option:		8-10
Option A		
PHY 2053	Physics 1	
& 2053L	and Laboratory for PHY 2053	
PHY 2054	Physics 2	
& 2054L	and Laboratory for PHY 2054	
Option B		
PHY 2048	Physics with Calculus 1	
& 2048L	and Laboratory for PHY 2048	
PHY 2049	Physics with Calculus 2	
& 2049L	and Laboratory for PHY 2049	
Total Foundation Credits		**39-42**
Required Biology Integrative Major Core Courses [1]		
BSC 4936	Critical Analysis of Biological Research	2
PCB 4674	Evolution	4
Select one Genetics requirement course:		3-4
PCB 3063	Genetics	
AGR 3303	Genetics	
PCB 4522	Molecular Genetics	
Select one Physiology requirement course:		4-5
BOT 3503	Physiology and Molecular Biology of Plants	
& 3503L	and Physiology and Molecular Biology of Plants Laboratory	
PCB 3713C	Cellular and Systems Physiology	
PCB 4723C	Physiology and Molecular Biology of Animals	
Select one Structural Biology requirement course:		3-4
PCB 3134	Eukaryotic Cell Structure and Function	
ZOO 3713C	Functional Vertebrate Anatomy	
ZOO 3603C	Evolutionary Developmental Biology	
Taxonomic Diversity requirement. Select at least one course from two of three groups:		7-8
Animal Diversity		
ZOO 4205C	Invertebrate Biodiversity	
ZOO 4307C	Vertebrate Biodiversity	
ZOO 4405	Sea Turtle Biology and Conservation	
ZOO 4462C	Herpetology	
ZOO 4472C	Avian Biology	
ZOO 4485	Marine Mammal Biology	
Plant and Fungal Diversity		
BOT 2011C	Plant Diversity	
BOT 2710C	Practical Plant Taxonomy	
BOT 3151C	Local Flora of North Florida	
PLP 4653C	Basic Fungal Biology	
Microorganisms and Microbial Diversity		
MCB 3020	Basic Biology of Microorganisms	
& 3020L	and Laboratory for Basic Biology of Microorganisms	
Additional major course (If needed to complete 27 credits of core courses)		0-4
Total Biology Integrative Major Core Credits		**27**
Total Credits		**128-142**

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

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 BA or 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/)

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/)

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.

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.

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 (https://cpm.flvc.org/advance-search/) 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

Semester 6

- Complete a minimum of 2 of the remaining Biology major 3000/4000 level required core courses

Semester 7

- Complete a minimum of 2 of the remaining Biology major 3000/4000 level required core courses

Semester 8

- Complete BSC 4936 (Capstone)
- Complete all remaining Biology major 3000/4000 level required core courses

Model Semester Plan

Students are expected to complete the Writing, Civic Literacy, summer enrollment, and Quest requirements while in the process of taking the courses below. Students are also expected to complete the general education international (GE-N) requirements concurrently with another general education requirement (typically, GE-C, H, or S) as part of the CLAS Basic Distribution requirements. One of the two general education mathematics courses must be a pure math course.

College of Liberal Arts and Sciences allows students additional flexibility in its Distribution Requirements. Students may count a maximum of 6 credits TOTAL from the CLAS Distribution course lists towards Humanities, Social and Behavioral Sciences, or Biological and Physical Sciences, with no more than 3 credits of Humanities, 3 credits of Social and Behavioral Sciences, or 6 credits of Biological or Physical Sciences.

The full list of major-specific requirements for this major can be found on the Overview tab. College of Liberal Arts and Sciences degree requirements can be found on the College's degree requirements page. (https://catalog.ufl.edu/UGRD/colleges-schools/UGLAS/#degreerequirementstext)

CHM 2211, CHM 2211L, PHY 2054, PHY 2054L, PHY 2049, and PHY 2049L count towards 3000 level or above electives outside of the major.

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		3
CHM 2045 & 2045L	General Chemistry 1 and General Chemistry Laboratory (**Critical Tracking**; State Core Gen Ed Physical Sciences)	4
MAC 2311	Analytic Geometry and Calculus 1 (**Critical Tracking**; State Core Gen Ed Mathematics)	4
State Core Gen Ed Social and Behavioral Sciences (http://catalog.ufl.edu/UGRD/academic-programs/general-education/#genedcoursestext)		3
	Credits	**14**
Semester Two		
CHM 2046 & 2046L	General Chemistry 2 and General Chemistry 2 Laboratory (**Critical Tracking**; Gen Ed Physical Science)	4
Select one:		3-4
MAC 2312	Analytic Geometry and Calculus 2 (Gen Ed Mathematics)	
STA 2023	Introduction to Statistics 1 (Gen Ed Mathematics)	
State Core Gen Ed Composition (http://catalog.ufl.edu/UGRD/academic-programs/general-education/#genedcoursestext); Writing Requirement		3
Gen Ed Social and Behavioral Sciences		3
Elective		3
	Credits	**16-17**
Semester Three		
Quest 2		3
BSC 2010 & 2010L	Integrated Principles of Biology 1 and Integrated Principles of Biology Laboratory (**Critical Tracking**; Gen Ed Biological Sciences)	4
Select one:		3-4
CHM 2210	Organic Chemistry 1 (**Critical Tracking**)	
CHM 3217	Organic Chemistry/Biochemistry 1 (**Critical Tracking**)	
State Core Gen Ed Humanities (http://catalog.ufl.edu/UGRD/academic-programs/general-education/#genedcoursestext)		3
Gen Ed Social and Behavioral Sciences		3
	Credits	**16-17**
Semester Four		
BSC 2011 & 2011L	Integrated Principles of Biology 2 and Integrated Principles of Biology Laboratory 2 (**Critical Tracking**; Gen Ed Biological Sciences)	4
CHM 2211 or CHM 3218	Organic Chemistry 2 [1] or Organic Chemistry/Biochemistry 2	3-4
CHM 2211L	Organic Chemistry Laboratory	2
Gen Ed Composition; Writing Requirement		3
Gen Ed Humanities		3
	Credits	**15-16**
Semester Five		
PCB 4043C	General Ecology	4
PHY 2048 or PHY 2053	Physics with Calculus 1 or Physics 1	3-4
PHY 2048L or PHY 2053L	Laboratory for PHY 2048 or Laboratory for PHY 2053	1
Gen Ed Humanities		3

Electives (3000 level or above, not in major, if needed)		6
	Credits	**17-18**
Semester Six		
Select one:		3-4
PCB 3063	Genetics	
AGR 3303	Genetics	
PCB 4522	Molecular Genetics	
PHY 2049	Physics with Calculus 2	3-4
or PHY 2054	or Physics 2	
PHY 2049L	Laboratory for PHY 2049	1
or PHY 2054L	or Laboratory for PHY 2054	
Taxonomic diversity course 1		3-4
CLAS Foreign Language Proficiency Requirement [2]		4-5
	Credits	**14-18**
Semester Seven		
Select one:		3-4
PCB 3134	Eukaryotic Cell Structure and Function	
ZOO 3603C	Evolutionary Developmental Biology	
ZOO 3713C	Functional Vertebrate Anatomy	
Taxonomic diversity course 2		3-4
CLAS Foreign Language Proficiency Requirement [2]		3-5
Elective (3000 level or above, not in major)		3
	Credits	**12-16**
Semester Eight		
BSC 4936	Critical Analysis of Biological Research (**Critical Tracking**)	2
Select one:		4-5
BOT 3503	Physiology and Molecular Biology of Plants	
& 3503L	and Physiology and Molecular Biology of Plants Laboratory	
PCB 3713C	Cellular and Systems Physiology	
PCB 4723C	Physiology and Molecular Biology of Animals	
PCB 4674	Evolution	4
Elective (or CLAS Foreign Language Proficiency Requirement if 4-3-3 language option) [2]		3
Elective		3
	Credits	**16-17**
	Total Credits	**120**

1 Select CHM 2211 if CHM 2210 was taken previously.

2 CLAS Foreign Language Proficiency Requirement (https://catalog.ufl.edu/UGRD/colleges-schools/UGLAS/#degreerequirementstext)

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

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 MCB 3020L, or PCB 3134 or PCB 4674	R	R		R

Assessment Types

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