

# BOTANICAL RESEARCH

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This program provides a broad background in the biology of plants, from the molecular to the whole-plant level. Botany students study anatomy, biochemistry, ecology, genetics, physiology, taxonomy, and molecular biology of plants. This flexible major 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:** General Botany ([http://catalog.ufl.edu/UGRD/colleges-schools/UGAGL/BTY\\_BS/BTY\\_BS02/](http://catalog.ufl.edu/UGRD/colleges-schools/UGAGL/BTY_BS/BTY_BS02/)) | Botanical Research (p. 1)
- **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

This option provides a strong background in the basic sciences and research, and is intended for students who plan to attend graduate school. Minimum grades of C are required in the foundation and botany major requirements.

Small classes are taught by faculty who have a commitment to undergraduate education. Students participate in mentored research, assisting faculty with research projects on campus and abroad. The major prepares students for careers in industry and government agencies, for graduate and professional schools, and for teaching jobs in high schools.

## Specializations

### General Botany

For students who may not intend to pursue a graduate degree but are interested in a career in plant biology. This specialization provides some flexibility in tailoring the courses needed in order to pursue specific interests. Students are encouraged to consult with an advisor and botany faculty member when deciding on which courses to take.

### Botanical Research

For students who intend to pursue a graduate degree and requires research with a faculty member. This specialization provides some flexibility in tailoring the courses needed in order to pursue specific interests. Students are encouraged to consult with an advisor and botany faculty member when deciding on which courses to take.

## Coursework for the Major

Required coursework is dependent upon the specialization. Coursework for each specialization can be found below under Critical Tracking and Model Semester Plan.

## Relevant Minors and/or Certificates

Students majoring in Botany can minor in most other disciplines, and this is a good way to organize students' electives around areas of interest. Note that botany majors cannot minor in Biology, nor can Biology majors minor in Botany (the curricula for the Botany and Biology majors are too similar).

## UFTeach Program

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

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

## Research

Botany majors are strongly encouraged to participate in research, and research is required for the Botanical Research specialization. Research experience is valuable on many levels: it diversifies the college experience; it teaches students how scientists apply the knowledge gained in the classroom to real world questions; it provides the opportunity to work with and get to know researchers who are the best in their field; it introduces students to cutting edge scientific questions and techniques; it can enhance a student's resume/CV when applying to graduate or professional school; and finally it is essential in helping students determine if science is a good career choice.

CALS botany majors may participate in research for course credit, as a scholar (e.g., University Scholar, Science for Life Scholar, Beckman Scholar), as a volunteer, or, in rare cases, as a paid research assistant. Please visit Undergraduate Research for information regarding course credit. Students who plan to enroll for course credit must contact potential research mentors, develop a project, and turn in the required application and proposal no later than the week before drop/add. If the window is missed, students should still contact potential research mentors, if only to discuss upcoming opportunities.

## Required Foundation Courses

Code	Title	Credits
<b>Required Foundation Courses</b>		
<i>Introductory Botany/Biology</i>		7-8
Select one option:		
<b>Option A (preferred)</b>		
BOT 2010C	Introductory Botany (preferred) <sup>1</sup>	
BOT 2011C	Plant Diversity <sup>1</sup>	
<b>Option B</b>		
BSC 2010 & 2010L	Integrated Principles of Biology 1 and Integrated Principles of Biology Laboratory 1	
BSC 2011 & 2011L	Integrated Principles of Biology 2 and Integrated Principles of Biology Laboratory 2	
<i>Chemistry</i>		16-18
Select one option:		
<b>Option A</b>		
CHM 3217	Organic Chemistry/Biochemistry 1	
CHM 2045 & 2045L	General Chemistry 1 and General Chemistry 1 Laboratory	
CHM 2211L	Organic Chemistry Laboratory	
<b>Option B</b>		
CHM 3217 & CHM 3218	Organic Chemistry/Biochemistry 1 and Organic Chemistry/Biochemistry 2	
CHM 2211L	Organic Chemistry Laboratory	
<i>Mathematics</i>		7
MAC 2311	Analytic Geometry and Calculus 1	4
Select one:		3
STA 2023	Introduction to Statistics 1	
COP 2800	Computer Programming Using JAVA (or equivalent)	
COP 3275	Computer Programming Using C (or equivalent)	
<i>Physics</i>		8-10
Select one option:		

<b>Option A</b>		
PHY 2053 & 2053L	Physics 1 and Laboratory for Physics 1	
PHY 2054 & 2054L	Physics 2 and Laboratory for Physics 2	
<b>Option B</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	
<b>Required Courses for the Botanical Research Specialization</b>		
AGR 3303 or PCB 3063	Genetics	3-4
PCB 4674	Evolution	4
BOT 2710C	Practical Plant Taxonomy	3
BOT 3503 & 3503L	Physiology and Molecular Biology of Plants and Physiology and Molecular Biology of Plants Laboratory	5
BOT 4911	Undergraduate Research in Botany	2
BSC 3911	Entering Research in Biology <sup>2</sup>	1
BSC 4936	Critical Analysis of Biological Research	2
<i>Ecology and Florida Biodiversity</i>		
Select two:		6-8
PCB 4043C	General Ecology	
PCB 3601C	Plant Ecology	
BOT 3151C	Local Flora of North Florida	
BSC 3307C	Climate Change Biology	4
<i>Cells and Tissues</i>		
Select one:		3-4
BOT 4935/5225C	Special Topics (Plant anatomy)	
PCB 3023	Essential Cell Biology	
BCH 4024	Introduction to Biochemistry and Molecular Biology	
<i>Biodiversity Breadth</i>		
Select one:		3-4
BOT 2011C	Plant Diversity <sup>1</sup>	
ZOO 4307C	Vertebrate Biodiversity	
ZOO 4926	Special Topics in Zoology (Mammalogy)	
ZOO 4205C	Invertebrate Biodiversity	
ENY 3005 & 3005L	Principles of Entomology and Principles of Entomology Laboratory	
WIS 4934	Topics in Wildlife Ecology and Conservation (Mammalogy)	
PLP 3002C	Fundamentals of Plant Pathology	
PLP 4653C	Basic Fungal Biology	
MCB 2000 & 2000L	Microbiology and Microbiology Laboratory	
MCB 3020 & 3020L	Basic Biology of Microorganisms and Laboratory for Basic Biology of Microorganisms	
<b>Total Credits</b>		<b>81-91</b>

<sup>1</sup> Students who select BOT 2011C to fulfill the foundation requirements may not use BOT 2011C to fulfill the biodiversity breadth requirements for the major.

<sup>2</sup> Must be taken prior to or concurrently with BOT 4911.

## 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 1 of 5 critical-tracking courses, including lab: BSC 2010/BSC 2010L or BOT 2010C, BSC 2011/BSC 2011L or BOT 2011C, CHM 2045/CHM 2045L, CHM 2046/CHM 2046L, MAC 2311
- 2.0 UF GPA required

## Semester 2

- Complete 1 additional critical-tracking course, including labs
- 2.0 UF GPA required

## Semester 3

- Complete 1 additional critical-tracking course, including labs, with a 2.5 GPA required for all critical-tracking courses
- 2.0 UF GPA required

## Semester 4

- Complete 1 additional critical-tracking course, including labs, with a 2.5 GPA required for all critical-tracking courses
- 2.0 UF GPA required

## Semester 5

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

## Semester 6

- Complete at least two Required Courses for the Botanical Research specialization
- 2.0 UF GPA required

## Semester 7

- Complete CHM 2210 or CHM 3217
- Complete PHY 2053/PHY 2053L or PHY 2048/PHY 2048L
- Complete at least 2 additional (4 total) Required Courses for the Botanical Research specialization
- 2.0 UF GPA required

## Semester 8

- Complete all remaining major course requirements
- 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.*

Course	Title	Credits
<b>Semester One</b>		
Quest 1 (Gen Ed Humanities)		3
BSC 1920	First Year Introduction: Biology at UF (recommended elective)	1
CHM 2045 & 2045L	General Chemistry 1 and General Chemistry 1 Laboratory ( <b>Critical Tracking</b> ; State Core Gen Ed Biological and Physical Sciences)	4
MAC 2311	Analytic Geometry and Calculus 1 ( <b>Critical Tracking</b> ; State Core Gen Ed Mathematics)	4

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> ); Writing Requirement		3
	<b>Credits</b>	<b>15</b>
<b>Semester Two</b>		
AEC 3033C	Research and Business Writing in Agricultural and Life Sciences (Writing Requirement)	3
Select one:		3-4
BSC 2010 & 2010L	Integrated Principles of Biology 1 and Integrated Principles of Biology Laboratory 1 ( <b>Critical Tracking</b> ; Gen Ed Biological Sciences)	
BOT 2010C	Introductory Botany ( <b>Critical Tracking</b> ; Gen Ed Biological Sciences)	
CHM 2046 & 2046L	General Chemistry 2 and General Chemistry 2 Laboratory ( <b>Critical Tracking</b> ; Gen Ed Physical Sciences)	4
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> )		3
Gen Ed Composition; Writing Requirement		3
	<b>Credits</b>	<b>16-17</b>
<b>Semester Three</b>		
Quest 2 (Gen Ed Social and Behavioral Sciences)		3
Select one:		4
BSC 2011 & 2011L	Integrated Principles of Biology 2 and Integrated Principles of Biology Laboratory 2 ( <b>Critical Tracking</b> ; Gen Ed Biological Sciences)	
BOT 2011C	Plant Diversity ( <b>Critical Tracking</b> ; Gen Ed Biological Sciences)	
CHM 2210	Organic Chemistry 1 ( <b>Critical Tracking</b> ; Gen Ed Physical Sciences)	3
State Core Gen Ed Humanities ( <a href="http://catalog.ufl.edu/UGRD/academic-programs/general-education/#genedcoursestext">http://catalog.ufl.edu/UGRD/academic-programs/general-education/#genedcoursestext</a> )		3
Elective		2
	<b>Credits</b>	<b>15</b>
<b>Semester Four</b>		
AEC 3030C	Effective Oral Communication	3
CHM 2211 & 2211L	Organic Chemistry 2 and Organic Chemistry Laboratory	5
Select one:		3
STA 2023	Introduction to Statistics 1 (Gen Ed Mathematics)	
COP 2800	Computer Programming Using JAVA (or equivalent)	
COP 3275	Computer Programming Using C (or equivalent; Gen Ed Mathematics)	
BSC 2891	Python Programming for Biology	
Gen Ed Mathematics <sup>1</sup>		3
	<b>Credits</b>	<b>14</b>
<b>Semester Five</b>		
Select one:		3-4
PCB 4043C	General Ecology ( <b>Critical Tracking</b> )	
PCB 3601C	Plant Ecology ( <b>Critical Tracking</b> )	
BOT 3151C	Local Flora of North Florida ( <b>Critical Tracking</b> )	
BSC 3307C	Climate Change Biology ( <b>Critical Tracking</b> )	
PCB 4674	Evolution ( <b>Critical Tracking</b> )	4
PHY 2053 & 2053L	Physics 1 and Laboratory for Physics 1	5
Gen Ed Humanities		3
	<b>Credits</b>	<b>15-16</b>
<b>Semester Six</b>		
BOT 2710C	Practical Plant Taxonomy ( <b>Critical Tracking</b> )	3
Select one:		3-4
BOT 4935/5225C	Special Topics ( <b>Critical Tracking</b> ; Plant Anatomy)	
PCB 3023	Essential Cell Biology ( <b>Critical Tracking</b> )	
BCH 4024	Introduction to Biochemistry and Molecular Biology ( <b>Critical Tracking</b> )	
PHY 2054 & 2054L	Physics 2 and Laboratory for Physics 2	5
Foreign language		5
	<b>Credits</b>	<b>16-17</b>
<b>Semester Seven</b>		
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 2023	Principles of Microeconomics (Gen Ed Social and Behavioral Sciences)	
AGR 3303 or PCB 3063	Genetics ( <b>Critical Tracking</b> ) or Genetics	3-4
BOT 4911 & BSC 3911	Undergraduate Research in Botany and Entering Research in Biology ( <b>Critical Tracking</b> )	4
Select one:		3-4
PCB 4043C	General Ecology ( <b>Critical Tracking</b> )	
PCB 3601C	Plant Ecology ( <b>Critical Tracking</b> )	
BOT 3151C	Local Flora of North Florida ( <b>Critical Tracking</b> )	
BSC 3307C	Climate Change Biology ( <b>Critical Tracking</b> )	
<b>Credits</b>		<b>13-16</b>
<b>Semester Eight</b>		
BOT 3503 & 3503L	Physiology and Molecular Biology of Plants and Physiology and Molecular Biology of Plants Laboratory	5
BSC 4936	Critical Analysis of Biological Research	2
Biodiversity breadth course		3-4
Electives		6
<b>Credits</b>		<b>16-17</b>
<b>Total Credits</b>		<b>120</b>

<sup>1</sup> Gen Ed Mathematics; if COP 2800 taken for computational requirement; or elective.

## Academic Learning Compact

The Botany major is offered by both the College of Liberal Arts and Sciences and the College of Agricultural and Life Sciences. This major provides a foundation in the life sciences with emphasis on plant systems. Students will learn the diversity of life, the structure of organisms and ecosystems and how they function (i.e., the acquisition, flow, organization and uses of information, energy and nutrients in living systems). Students will learn the scientific method and how it facilitates the discovery of new knowledge in botany and biology, including how to critically evaluate hypotheses and conclusions.

## Before Graduating Students Must

- Achieve acceptable performance in all required botany courses.
- 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
BOT 2011C	R	R		I
BOT 2710C	R	R		R
BOT 3503 and BOT 3503L	R/A	R/A		R/A
BSC 2010	I	I	I	
BSC 2011	I	I		

PCB 3601C	R/A	R/A	R/A	R/A
PCB 4043C	R/A	R/A	R/A	R/A

## Assessment Types

- Major field test for biology
  - Bioethics quiz
  - Scientific paper
-