

# BOTANICAL RESEARCH

The Botany curriculum provides a broad background in the biology of plants, from the molecular to the organismic level. Students who major in Botany will take courses in ecology, genetics, physiology, taxonomy, evolution, cells and tissues, molecular biology, and biodiversity of plants.

## About this Program

- **College:** Liberal Arts and Sciences (<http://catalog.ufl.edu/UGRD/colleges-schools/UGLAS/>)
- **Degree:** Bachelor of Science
- **Specializations:** General Botany ([http://catalog.ufl.edu/UGRD/colleges-schools/UGLAS/BOT\\_BS/BOT\\_BS02/](http://catalog.ufl.edu/UGRD/colleges-schools/UGLAS/BOT_BS/BOT_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

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.

The Botanical Research specializations provides a strong background in the basic sciences and research, and is intended for students who plan to attend graduate school. This specialization provides the coursework background typically required by botany graduate programs and research with a faculty member. Students are encouraged to consult with an advisor and biology faculty member when deciding on which courses to take.

## Requirements for the Major

The Botanical Research specialization requires a total of 67-80 credits consisting of 34-43 credits of foundation coursework and 32-37 credits of major coursework. A student must achieve a minimum grade of C in all required courses for the major.

Code	Title	Credits
<b>Required Foundation Courses</b>		
Select one:		3-8
BOT 2010C & BOT 2011C	Introductory Botany and Plant Diversity (preferred) <sup>1</sup>	
<b>OR</b>		
BSC 2010 & 2010L	Integrated Principles of Biology 1 and Integrated Principles of Biology Laboratory (AND)	

BSC 2011 & 2011L	Integrated Principles of Biology 2 and Integrated Principles of Biology Laboratory 2 (8 credits total)	
CHM 2045 & 2045L	General Chemistry 1 and General Chemistry Laboratory	4
CHM 2046 & 2046L	General Chemistry 2 and General Chemistry 2 Laboratory	4
Select one option:		8-10
Option A		
CHM 2210 & CHM 2211	Organic Chemistry 1 and Organic Chemistry 2	
CHM 2211L	Organic Chemistry Laboratory	
Option B		
CHM 3217 & CHM 3218	Organic Chemistry/Biochemistry 1 and Organic Chemistry/Biochemistry 2	
CHM 2211L	Organic Chemistry Laboratory	
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)	
BSC 2891	Python Programming for Biology	
Select one option:		8-10
Option A		
PHY 2053 & 2053L	Physics 1 and Laboratory for PHY 2053	
PHY 2054 & 2054L	Physics 2 and Laboratory for PHY 2054	
Option B		
PHY 2048 & 2048L	Physics with Calculus 1 and Laboratory for PHY 2048	
PHY 2049 & 2049L	Physics with Calculus 2 and Laboratory for PHY 2049	
<b>Core 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	
<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>Botanical Research Specialization Biodiversity Breadth Major Electives</i>		
Select one:		3-4
BOT 2011C	Plant Diversity <sup>1</sup>	
BOT 4650	Plant Symbiosis	
PCB 4460	Biodiversity and Ecology Field Immersion	
ZOO 4205C	Invertebrate Biodiversity	
ZOO 4307C	Vertebrate Biodiversity	
ZOO 4472C	Avian Biology	
ZOO 4926	Special Topics in Zoology (Mammalogy)	

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

**Total Credits****66-80**

- <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 concurrently with BOT 4911.

## Relevant Minors and 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 or chemistry, 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 (<https://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.

CLAS Biology, Botany, and Zoology 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. 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 of drop/add. If the window is missed, students should still contact potential research mentors to discuss upcoming opportunities.

More Info (<https://biology.ufl.edu/undergraduates/research/>)

## 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 (<http://catalog.ufl.edu/UGRD/colleges-schools/UGLAS/>).

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 2 required courses for this 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 this 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, 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/#degree requirementstext>)

CHM 2211, CHM 2211L, PHY 2054, PHY 2054L, PHY 2049, and PHY 2049L count towards 3000 level or above electives outside of the major. COP 3275 may also count towards the requirement if taken.

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		3
CHM 2045 & 2045L	General Chemistry 1 and General Chemistry Laboratory ( <b>Critical Tracking</b> ; Gen Ed Physical Sciences; Natural Science Laboratory ) <sup>2</sup>	4
MAC 2311	Analytic Geometry and Calculus 1 ( <b>Critical Tracking</b> ; State Core Gen Ed Mathematics)	4
State Core Gen Ed Composition Requirement	( <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>14</b>

**Semester Two**

Select one:		3-4
BSC 2010 & 2010L	Integrated Principles of Biology 1 and Integrated Principles of Biology Laboratory ( <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
Gen Ed Social and Behavioral Science		3
<b>Credits</b>		<b>16-17</b>

**Semester Three**

Quest 2		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	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
Gen Ed Social and Behavioral Sciences		3
<b>Credits</b>		<b>16</b>

**Semester Four**

CHM 2211 & 2211L	Organic Chemistry 2 and Organic Chemistry Laboratory	5
PHY 2053 & 2053L	Physics 1 and Laboratory for PHY 2053 ( <b>Critical Tracking</b> ; Gen Ed Physical Sciences)	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)	
BSC 2891	Python Programming for Biology	
Elective (or Gen Ed Mathematics if STA 2023 not selected)		3
<b>Credits</b>		<b>16</b>

**Semester Five**

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 2054 & 2054L	Physics 2 and Laboratory for PHY 2054	5
Gen Ed Humanities		3
<b>Credits</b>		<b>15-16</b>

**Semester Six**

BOT 2710C	Practical Plant Taxonomy ( <b>Critical Tracking</b> )	3
Select one:		3-4
BOT 4935/5225C	Special Topics (Plant Anatomy; <b>Critical Tracking</b> )	
PCB 3023	Essential Cell Biology ( <b>Critical Tracking</b> )	
BCH 4024	Introduction to Biochemistry and Molecular Biology ( <b>Critical Tracking</b> )	
Electives		4
CLAS Foreign Language Proficiency Requirement <sup>1</sup>		4-5
<b>Credits</b>		<b>14-16</b>

**Semester Seven**

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> )	
CLAS Foreign Language Proficiency Requirement <sup>1</sup>		3-5
	<b>Credits</b>	<b>13-17</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
Gen Ed Humanities		3
Elective (or CLAS Foreign Language Proficiency Requirement if 4-3-3 language option) Elective <sup>1</sup>		3
	<b>Credits</b>	<b>16-17</b>
	<b>Total Credits</b>	<b>120</b>

<sup>1</sup> CLAS Foreign Language Proficiency Requirement (<https://catalog.ufl.edu/UGRD/colleges-schools/UGLAS/#degreerequirementstext>)

<sup>2</sup> Degree Requirements (<https://catalog.ufl.edu/UGRD/colleges-schools/UGLAS/#degreerequirementstext>)

## 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 2710	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
-