CHEMISTRY

Chemistry is often called the *central science* because of the pivotal role it plays in the biological and physical sciences, as well as in engineering, agriculture, medicine, and allied health disciplines. Bachelor's degree chemists choose from diverse paths for their short-term and lifetime careers, including graduate study in a variety of programs, rewarding employment in industry or government laboratories, professional or law school, or much-needed teaching in high schools.

About this Program

- **College:** Liberal Arts and Sciences (http://catalog.ufl.edu/UGRD/colleges-schools/UGLAS/)
- **Degree:** Bachelor of Science
- **Specializations:** Biochemistry (http://catalog.ufl.edu/UGRD/colleges-schools/UGLAS/CHY_BS/CHY_BS01/) | Chemistry (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 Chemistry is a comprehensive department granting bachelor's, master's, and PhD degrees with specialization in all areas including biochemistry, nanochemistry, analytical, inorganic, organic, physical, polymer, synthetic, and theoretical chemistry. The University of Florida ranks in the top five chemistry departments nationally in PhD production and is among the top 20 in bachelor's graduates.
Website (https://www.chem.ufl.edu/)

CONTACT

Email (advising@chem.ufl.edu) | 352.392.0541 (tel) | 352.392.8758 (fax)

P.O. Box 117200
214 LEIGH HALL
GAINESVILLE FL 32611-7200
Map (http://campusmap.ufl.edu/#/index/0009)

Curriculum

- Chemistry Minor
- Chemistry | Biochemistry

Students can choose the Chemistry specialization, which is comparable to that offered in any major university, or the Biochemistry specialization, which is designed to give more flexibility to students wanting to pursue courses with biological focus. The department encourages students in either specialization to include undergraduate research with one of the department's internationally recognized faculty as a component of the undergraduate experience. Undergraduate research will frequently result in journal publications and/or presentations at scientific meetings.

Requirements for the Majors

The Chemistry major requires a total of 55-60 credits including 25-30 credits of foundation coursework and 30 credits of major coursework.

The Biochemistry major requires a total of 62-69 credits including 29-34 credits of foundation coursework and 33-35 credits of major coursework.

Required coursework will depend upon the program chosen. Coursework for each specialization can be found below under Critical Tracking and Model Semester Plan.

All required courses must be completed within two attempts with minimum grades of C.

Code	Title	Credits
Required Foundation Coursework		
Select one option:		5-8
Option A		
CHM 2045	General Chemistry 1	
& 2045L	and General Chemistry Laboratory	
CHM 2046	General Chemistry 2	
& 2046L	and General Chemistry 2 Laboratory	
Option B		
CHM 2050	Honors General Chemistry 1 for Majors	
& CHM 2045L	and General Chemistry Laboratory	

CHM 2051 & CHM 2046L	Honors General Chemistry 2 and General Chemistry 2 Laboratory	
Option C		
CHM 2047 & 2047L	One-Semester General Chemistry and One-Semester General Chemistry Laboratory [1]	
MAC 2311	Analytic Geometry and Calculus 1	4
MAC 2312	Analytic Geometry and Calculus 2	4
MAC 2313	Analytic Geometry and Calculus 3	4
Select one option:		8-10
Option A		
PHY 2048 & 2048L	Physics with Calculus 1 and Laboratory for PHY 2048	
PHY 2049 & 2049L	Physics with Calculus 2 and Laboratory for PHY 2049	
Option B		
PHY 2053 & 2053L	Physics 1 and Laboratory for PHY 2053	
PHY 2054 & 2054L	Physics 2 and Laboratory for PHY 2054	
Required Chemistry Major Core Coursework		
Select one option:		8
Option A		
CHM 2212	Organic Chemistry 1 for Majors	
CHM 2213	Organic Chemistry 2 for Majors	
CHM 2211L	Organic Chemistry Laboratory	
Option B		
CHM 2210	Organic Chemistry 1	
CHM 2211	Organic Chemistry 2	
CHM 2211L	Organic Chemistry Laboratory	
CHM 3120 & 3120L	Introduction to Analytical Chemistry and Analytical Chemistry Laboratory	4
CHM 4130 & 4130L	Instrumental Analysis and Instrumental Analysis Laboratory	5
CHM 3610	Inorganic Chemistry	3
CHM 4411 & CHM 4412	Physical Chemistry: Thermodynamics and Kinetics and Physical Chemistry: Chemical Bonding and Spectroscopy	8
CHM 4411L	Physical Chemistry Laboratory	2
MAP 2302	Elementary Differential Equations (encouraged)	
Total Credits		**55-60**

CHM 2095/CHM 2095L and CHM 2096/CHM 2096L can substitute for CHM 2045/CHM 2045L and CHM 2046/CHM 2046L for students who switched majors from engineering

Required Exit Exam

Students must also complete the exit exam (Diagnostic of Undergraduate Chemistry Knowledge) with a minimum score of 30 out of 60.

The required courses in the Chemistry major are generally offered every Fall and Spring. Because of budgetary and other restrictions, Summer schedules cannot be predetermined and required courses generally are offered in Summer C (12 weeks).

Recommended Coursework

The Chemistry program at the University of Florida is approved by the American Chemistry Society (ACS). Students completing a baccalaureate degree in the standard Chemistry specialization may enhance their undergraduate experience by completing an ACS-certified degree. The ACS-certified degree is comprised of foundational coursework from each of the five subdisciplines of Chemistry (analytical, biochemistry, inorganic, physical, and organic), as well as additional in-depth courses and laboratory experiences.

The following coursework and lab experiences are necessary to satisfy the requirements for ACS certification:

- Completion of all coursework for the standard Chemistry specialization
- CHM 3218 (https://catalog.ufl.edu/search/?P=CHM%203218)
- CHM 3610L (https://catalog.ufl.edu/search/?P=CHM%203610L)
- An additional 4000-level CHM lecture course (2-3 credits)

An additional 4000-level CHM laboratory course or CHM 4910 (https://catalog.ufl.edu/search/?P=CHM%204910)

UFTeach Program

There is a severe shortage of qualified high school chemistry teachers in Florida and nationwide. Students interested in becoming part of this high-demand profession should see a chemistry advisor about the UFTeach program. UFTeach students complete the UFTeach minor in science teaching with their BS in Chemistry and have the coursework and preparation for professional teacher certification in Florida when they graduate.
More Info (https://education.ufl.edu/uf-teach/)

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 one CHM course and one MAC course
- 2.0 UF GPA required

Semester 2

- Complete CHM 2045/CHM 2045L and MAC 2311
- 2.50 critical-tracking GPA and any additional CHM courses
- 2.0 UF GPA required

Semester 3

- Complete CHM 2046/CHM 2046L and MAC 2312
- 2.65 critical-tracking GPA and any additional CHM courses
- 2.0 UF GPA required

Semester 4

- 2.75 critical-tracking GPA and any additional CHM courses
- 2.0 UF GPA required

Semester 5

- Complete MAC 2313; and CHM 2212 or CHM 2210
- 2.75 critical-tracking GPA and any additional CHM courses
- 2.0 UF GPA required

Semester 6

- Complete CHM 3120/CHM 3120L, and CHM 2213/CHM 2211L or CHM 2211/CHM 2211L
- 2.0 UF GPA required

Semester 7

- Complete 2 of the remaining CHM 3XXX/4XXX required courses
- 2.0 UF GPA required

Semester 8

- Complete all of the remaining 3XXX/4XXX required courses
- 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/#degreerequirementstext)

MAC 2312, MAC 2313, PHY 2049, PHY 2049L, PHY 2054, and PHY 2054L 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; Natural Science Laboratory) [3]	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 Sciences)	4
MAC 2312	Analytic Geometry and Calculus 2 (**Critical Tracking**; Gen Ed Mathematics)	4
State Core Gen Ed Composition (http://catalog.ufl.edu/UGRD/academic-programs/general-education/#genedcoursestext); Writing Requirement		3
State Core Gen Ed Humanities (http://catalog.ufl.edu/UGRD/academic-programs/general-education/#genedcoursestext)		3
Gen Ed Biological Sciences		3
	Credits	**17**
Semester Three		
CHM 2212	Organic Chemistry 1 for Majors (**Critical Tracking**)	3
MAC 2313	Analytic Geometry and Calculus 3 (**Critical Tracking**; Gen Ed Mathematics)	4
Select one:		3-4
PHY 2048	Physics with Calculus 1 (Gen Ed Physical Sciences)	
PHY 2053	Physics 1 (Gen Ed Physical Sciences)	
Select one:		1
PHY 2048L	Laboratory for PHY 2048 (Gen Ed Physical Sciences)	
PHY 2053L	Laboratory for PHY 2053 (Gen Ed Physical Sciences)	
Quest 2		3
	Credits	**14-15**
Semester Four		
CHM 2213 & CHM 2211L	Organic Chemistry 2 for Majors and Organic Chemistry Laboratory (**Critical Tracking**)	5
Select one:		3-4
PHY 2049	Physics with Calculus 2 (Gen Ed Physical Sciences)	
PHY 2054	Physics 2 (Gen Ed Physical Sciences)	
Select one:		1
PHY 2049L	Laboratory for PHY 2049 (Gen Ed Physical Sciences)	
PHY 2054L	Laboratory for PHY 2054 (Gen Ed Physical Sciences)	
CLAS Foreign Language Proficiency Requirement [2]		4-5
Elective		1
	Credits	**14-16**
Semester Five		
CHM 3120 & 3120L	Introduction to Analytical Chemistry and Analytical Chemistry Laboratory (**Critical Tracking**) [1]	4

Gen Ed Biological Sciences		3
Gen Ed Humanities		3
Gen Ed Social and Behavioral Sciences		3
CLAS Foreign Language Proficiency Requirement [2]		3-5
	Credits	**16-18**
Semester Six		
CHM 4130 & 4130L	Instrumental Analysis and Instrumental Analysis Laboratory	5
CHM 4411	Physical Chemistry: Thermodynamics and Kinetics	4
Gen Ed Composition; Writing Requirement		3
Elective (or CLAS Foreign Language Proficiency Requirement if 4-3-3 language option) [2]		3
	Credits	**15**
Semester Seven		
CHM 3610	Inorganic Chemistry	3
CHM 4411L	Physical Chemistry Laboratory	2
CHM 4412	Physical Chemistry: Chemical Bonding and Spectroscopy	4
Gen Ed Social and Behavioral Sciences		3
Gen Ed Humanities		3
	Credits	**15**
Semester Eight		
Electives (3000 level or above, not in department)		6
Electives		9
	Credits	**15**
	Total Credits	**120**

1 Take CHM 3120/CHM 3120L after CHM 2046/CHM 2046L, but no later than the first semester of the third year.

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

3 Degree Requirements (https://catalog.ufl.edu/UGRD/colleges-schools/UGLAS/#degreerequirementstext)

Academic Learning Compact

Chemistry is the study of matter: the structure and properties of matter, the transformations from one form of matter to another, and the energy transformations associated with these transformations.

Before Graduating Students Must

- Achieve at least 50% on the Diagnostic of Undergraduate Chemistry Knowledge (DUCK) exam.
- Obtain minimum grades of C in laboratory courses:

Code	Title	Credits
CHM 2211	Organic Chemistry 2	3
CHM 3120L	Analytical Chemistry Laboratory	1
CHM 4130L	Instrumental Analysis Laboratory	2
CHM 4411L	Physical Chemistry Laboratory	2
or CHM 4413L	Biophysical Chemistry Laboratory	

- Complete requirements for the baccalaureate degree, as determined by the chemistry faculty.

Students in the Major Will Learn to

Student Learning Outcomes | SLOs

Content

1.
   - **Standard Chemistry**
     Explain and apply facts, theories and concepts in
     i. physical
     ii. organic
     iii. inorganic
     iv. analytical chemistry
   - **Biochemistry**
     Explain and apply facts, theories and concepts in

i. physical
ii. organic
iii. inorganic
iv. analytical chemistry
v. biochemistry

2.

- **Standard Chemistry**
  Demonstrate and safely apply laboratory skills in
  i. synthetic
  ii. quantitative
  iii. instrumental methods as scientific approaches to gathering and verifying knowledge
- **Biochemistry**
  Apply laboratory skills in
  i. synthetic
  ii. quantitative
  iii. instrumental
  iv. biochemical methods as scientific approaches to gathering and verifying knowledge

Critical Thinking

3. **Standard Chemistry and Biochemistry**
   Interpret, evaluate, explain and critically assess theories and experimental results in chemistry or biochemistry.

Communication

4. **Standard Chemistry and Biochemistry**
   Collect, analyze and articulate results clearly and effectively in both oral and written formats.

Curriculum Map

I = Introduced; R = Reinforced; A = Assessed

Standard Chemistry

Courses	SLO 1-A	SLO 1-B	SLO 1-C	SLO 1-D	SLO 2-A	SLO 2-B	SLO 2-C	SLO 2-D	SLO 3	SLO 4
CHM 2045 and CHM 2046	I		I	I						
CHM 2211L					I, A					I
CHM 2212 and CHM 2213		I								
CHM 3120 and CHM 4130				R						
CHM 3120L						I, A	I			I
CHM 3610			R							
CHM 4130L						R	R, A		I	R, A
CHM 4411 and CHM 4412	R									
CHM 4411L						R	R		R	R, A
DUCK Exam	A	A	A	A						

Biochemistry

Courses	SLO 1-A	SLO 1-B	SLO 1-C	SLO 1-D	SLO 1-E	SLO 2-A	SLO 2-B	SLO 2-C	SLO 2-D	SLO 3	SLO 4
CHM 2045 and CHM 2046	I		I	I							
CHM 2211L						I, A					I

CHM 2212 and CHM 2213		I									
CHM 3120				R							
CHM 3120L							I, A	I			I
CHM 3218					I						
CHM 3400	R										
CHM 3610			R								
CHM 4300L									I		
CHM 4413L							R	R		R	R, A
DUCK Exam	A	A	A	A							

Assessment Types for Both Specializations

- Oral tests or reports
- Written reports
- Lab practicals