

CHEMISTRY, B.S.

A Bachelor of Science with a major in chemistry from our department has a strong emphasis on courses in chemistry, physics and mathematics. The flexibility to take courses in the humanities, arts and other areas of interest allows students to make the degree truly their own. The B.S. with a major in chemistry is an ideal double major for a many complementary areas of study, such as the sciences, mathematics, computer programming, education and pre-health. Students gain a solid scientific foundation, written communication skills and understanding of advanced chemistry topics and application of computer programming within the field.

Learning Outcomes

1. Students will explain basic and advanced chemistry concepts and apply them in problem-solving.
2. Students will write effectively about chemistry concepts, principles, and processes.
3. Students will apply basic computer programming and information retrieval skills to questions and problems in chemistry.
4. Students will explain advanced chemistry topics and apply them in the chemical research process.

Admissions

Entrance Requirements

New freshmen who meet University admissions standards are eligible for admission to degree programs offered by the college. A student who wishes to enter the College of Arts and Sciences from another college on the Columbia campus must be in good standing and have a cumulative GPA of 2.00 or higher. A student who wishes to enter the College of Arts and Sciences from another USC campus must fulfill one of the following requirements:

1. Be in good standing, meet the admission requirements for a baccalaureate degree on the Columbia campus, and have a cumulative GPA of 2.00 or higher.
2. Be in good standing and have completed 30 semester hours with a GPA of 2.00 or higher on a USC campus.

Some programs in the College of Arts and Sciences have special admission requirements established by the department or committee that supervises the specific degree program, for example, Cardiovascular Technology, Biological Sciences, Chemistry, Biochemistry and Molecular Biology, Economics, Environmental Science, the Bachelor of Arts in Interdisciplinary Studies, and the Bachelor of Science in Interdisciplinary Studies. These requirements are listed in the sections of this bulletin that describe department and special degree programs.

Degree Requirements (120 hours)

Program of Study

Requirements	Credit Hours
1. Carolina Core	34-46
2. College Requirements	12-19
3. Program Requirements	28-47
4. Major Requirements	27

Founding Documents Requirement

All undergraduate students must take a 3-credit course or its equivalent with a passing grade in the subject areas of History, Political Science, or African American Studies that covers the founding documents including the United State Constitution, the Declaration of Independence, the Emancipation Proclamation and one or more documents that are foundational to the African American Freedom struggle, and a minimum of five essays from the Federalist papers. This course may count as a requirement in any part of the program of study including the Carolina Core, the major, minor or cognate, or as a general elective. Courses that meet this requirement are listed here (<https://academicbulletins.sc.edu/undergraduate/founding-document-courses/>).

1. Carolina Core Requirements (34-46 hours)

CMW – Effective, Engaged, and Persuasive Communication: Written (6 hours)

must be passed with a grade of C or higher

- any CC-CMW courses (<https://academicbulletins.sc.edu/undergraduate/carolina-core-courses/>)

ARP – Analytical Reasoning and Problem Solving (8 hours)

- MATH 141*
- MATH 142*

SCI – Scientific Literacy (8 hours)

must be passed with a grade of C or higher

- PHYS 211* & PHYS 211L*
- PHYS 212* & PHYS 212L*

GFL – Global Citizenship and Multicultural Understanding: Foreign Language (0-6 hours)

Demonstration of proficiency in one foreign language equivalent to the minimal passing grade on the exit examination in the 122 course is required. Students can demonstrate this proficiency by successfully completing Phase II of the Proficiency Test or by successfully completing the 122 course, including the exit exam administered as part of that course.

- CC-GFL courses (<https://academicbulletins.sc.edu/undergraduate/carolina-core-courses/>)

It is strongly recommended that students continuing the study of a foreign language begin college-level study of that language in their first semester and continue in that language until their particular foreign language requirement is completed.

GHS – Global Citizenship and Multicultural Understanding: Historical Thinking (3 hours)

- any CC-GHS course (<https://academicbulletins.sc.edu/undergraduate/carolina-core-courses/>)

GSS – Global Citizenship and Multicultural Understanding: Social Sciences (3 hours)

- any CC-GSS course (<https://academicbulletins.sc.edu/undergraduate/carolina-core-courses/>)

AIU – Aesthetic and Interpretive Understanding (3 hours)

- any CC-AIU course (<https://academicbulletins.sc.edu/undergraduate/carolina-core-courses/>)

CMS – Effective, Engaged, and Persuasive Communication: Spoken Component ¹ (0-3 hours)

- any overlay or stand-alone CC-CMS course (<https://academicbulletins.sc.edu/undergraduate/carolina-core-courses/>)

INF – Information Literacy ¹ (0-3 hours)

- any overlay or stand-alone CC-INF course (<https://academicbulletins.sc.edu/undergraduate/carolina-core-courses/>)

VSR – Values, Ethics, and Social Responsibility ¹ (0-3 hours)

- any overlay or stand-alone CC-VSR course (<https://academicbulletins.sc.edu/undergraduate/carolina-core-courses/>)

¹ **Carolina Core Stand Alone or Overlay Eligible Requirements** – Overlay-approved courses offer students the option of meeting two Carolina Core components in a single course. A maximum of two overlays is allowed. The total Carolina Core credit hours must add up to a minimum of 31 hours. Some programs may have a higher number of minimum Carolina Core hours due to specified requirements.

2. College Requirements (12-19 hours)

Foreign Language (0-3 hours)

- only if needed to meet 122-level proficiency

Analytical Reasoning (3-7 hours)

Course	Title	Credits
CSCE 145	Algorithmic Design I (*)	4
or CSCE 106	Scientific Applications Programming	
STAT 509	Statistics for Engineers (*)	3
or STAT 515	Statistical Methods I	
Total Credit Hours		7

Note: If CHEM 111, CHEM 112, CHEM 322, and CHEM 322L (or CHEM 141, CHEM 142, CHEM 322 and CHEM 322L) are all completed at USC, STAT 509 or STAT 515 is not required. Also, if CHEM 621 and CHEM 621L are completed, STAT 509 or STAT 515 is not required. Students who exempt STAT 509 or STAT 515 through this process will be required to take an approved elective to reach minimum hours for graduation.

History (3 hours)

The College of Arts and Sciences requires one additional GHS course beyond the Carolina Core GHS requirement.

- If the Carolina Core GHS requirement is fulfilled by a **U.S. history** course, the College of Arts and Sciences history requirement must be fulfilled by a **non-U.S. history** course.
- If the Carolina Core GHS requirement is fulfilled by a **non-U.S. history** course, the College of Arts and Sciences history requirement must be fulfilled by a **U.S. history** course.

Please select the College of Arts and Sciences history requirement from the approved list of U.S. and non-U.S. history courses (<https://academicbulletins.sc.edu/undergraduate/arts-sciences/history-requirement/>).

Social Science and Fine Arts or Humanities (6 hours)

- Social Science (3 hours)**
 - The College of Arts and Science requires one 3-hour Social Science Course (<https://academicbulletins.sc.edu/undergraduate/arts-sciences/courses-acceptable-social-science/>)
- Fine Arts/Humanities (3 Hours)**
 - A Bachelor of Science from the College of Arts and Sciences requires one 3-hour Fine Arts/Humanities Course (<https://academicbulletins.sc.edu/undergraduate/arts-sciences/courses-acceptable-fine-arts-humanities/>)

3. Program Requirements (28-47 hours)

Supporting Courses (11 hours)

Course	Title	Credits
MATH 241	Vector Calculus (*)	3
CHEM 141	Principles of Chemistry I (*)	4
CHEM 142	Principles of Chemistry II (*)	4
Total Credit Hours		11

Note: Students transferring in to the major can substitute CHEM 111/CHEM 111L (or transfer equivalent) for CHEM 141 and CHEM 112/CHEM 112L (or transfer equivalent) for CHEM 142.

Cognate (12 hours)

The cognate must consist of twelve (12) hours of courses at the advanced level, outside of but related to the major. The cognate may be taken in one or more departments or programs.

Courses offered by departments and programs that are acceptable for cognate credit are outlined in the section titled Courses Acceptable for Cognate Credit in Degree Programs in the College of Arts and Sciences (<https://academicbulletins.sc.edu/undergraduate/arts-sciences/courses-acceptable-cognate/>). Some major programs have specific cognate requirements. It should be emphasized that the cognate is not a second set of elective courses to be chosen at random by the student. Students are urged to consult their major advisors for specific requirements in their major.

Unless otherwise noted, for Bachelor of Science degrees, cognate courses passed with a grade of D or higher are acceptable.

Minor (18 hours) *optional*

In place of the cognate a student in the College of Arts and Sciences may choose a minor consisting of at least 18 credit hours of prescribed courses.

The minor is intended to develop a coherent basic preparation in a second area of study. It differs from the cognate inasmuch as the courses must follow a structured sequence.

Courses applied toward general education requirements cannot be counted toward the minor. No course may satisfy both major and minor requirements. All minor courses must be passed with a grade of C or

higher. At least half of the courses in the minor must be completed in residence at the University.

A list of minor programs of study can be found at Programs A-Z (<https://academicbulletins.sc.edu/undergraduate/programs-az/>).

Electives (0-24 hours)

120 (or 128) degree applicable credits are required to complete any degree at UofSC. After the cognate, minor or second major is complete, any additional credits needed to reach 120 (or 128) total credits can be fulfilled by electives. No courses of a remedial, developmental, skill-acquiring, or vocational nature may apply as credit toward degrees in the College of Arts and Sciences. The College of Arts and Sciences allows the use of the Pass-Fail option on elective courses. Further clarification on inapplicable courses can be obtained from the College of Arts and Sciences.

4. Major Requirements (27 hours)

a minimum grade of C is required in all major courses

Major Courses (24 hours)

Course	Title	Credits
CHEM 322	Analytical Chemistry	3
CHEM 322L	Analytical Chemistry Laboratory	1
CHEM 333	Organic Chemistry I	3
CHEM 333L	Comprehensive Organic Chemistry Laboratory I	2
CHEM 334	Organic Chemistry II	3
CHEM 334L	Comprehensive Organic Chemistry Laboratory II	2
CHEM 541	Physical Chemistry	3
CHEM 541L	Physical Chemistry Laboratory	2
CHEM 542	Physical Chemistry	3
CHEM 542L	Physical Chemistry Laboratory	2
Total Credit Hours		24

Major Electives (3 hours)

Course	Title	Credits
CHEM 511	Inorganic Chemistry	3
CHEM 533	Comprehensive Organic Chemistry III	3
CHEM 545	Physical Biochemistry	3
CHEM 550	Biochemistry	3
CHEM 555	Biochemistry/Molecular Biology I	3
CHEM 621	Instrumental Analysis	3
CHEM 623	Introductory Environmental Chemistry	3
CHEM 624	Aquatic Chemistry	3
CHEM 633	Introduction to Polymer Synthesis	3
CHEM 644	Materials Chemistry	3

Note: Students who transfer into the program after completion of CHEM 331L and CHEM 332L may meet the organic chemistry requirements by completing CHEM 334L.

Major Map

A major map is a layout of required courses in a given program of study, including critical courses and suggested course sequences to ensure a clear path to graduation.

Major maps are only a suggested or recommended sequence of courses required in a program of study. Please contact your academic advisor for assistance in the application of specific coursework to a program of study and course selection and planning for upcoming semesters.

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