

BACHELOR OF ARTS (BA) DEGREE WITH A MAJOR IN CHEMISTRY

Program Learning Outcomes for the BA Degree with a Major in Chemistry

Upon completing the BA degree with a major in Chemistry, students will be able to:

1. Demonstrate understanding of and proficiency with: the structure, bonding, spectroscopy, and reactivity of organic compounds and functional groups; curved-arrow formalism to describe reaction mechanisms; and the synthesis of organic compounds.
2. Demonstrate understanding of and proficiency with: thermochemical principles, acid-base and redox reactions; structure of simple solids and construction of molecular orbital diagrams (group theory); and survey of main group chemistry.
3. Demonstrate understanding of: the principles of quantum mechanics and applications to atomic and molecular structure and spectroscopy; classical and basic statistical thermodynamics and applications to equilibrium physico-chemical systems; and kinetics of gas phase processes and chemical reactions.
4. Understand and apply the scientific method and be able to communicate scientific findings.

Requirements for the BA Degree with a Major in Chemistry

For general university requirements, see [Graduation Requirements \(https://ga.rice.edu/undergraduate-students/academic-policies-procedures/graduation-requirements/\)](https://ga.rice.edu/undergraduate-students/academic-policies-procedures/graduation-requirements/). Students pursuing the BA degree with a major in Chemistry must complete:

- A minimum of 21-23 courses, depending on course selection, (55 credit hours) to satisfy major requirements.
- A minimum of 120 credit hours to satisfy degree requirements.
- A minimum of 9 courses (24 credit hours) taken at the 300-level or above.

The courses listed below satisfy the requirements for this major. In certain instances, courses not on this official list may be substituted upon approval of the major's academic advisor, or where applicable, the department's Director of Undergraduate Studies. (Course substitutions must be formally applied and entered into Degree Works by the major's [Official Certifier \(https://registrar.rice.edu/facstaff/degreeworks/officialcertifier/\)](https://registrar.rice.edu/facstaff/degreeworks/officialcertifier/).) Students and their academic advisors should identify and clearly document the courses to be taken.

Summary

Code	Title	Credit Hours
Total Credit Hours Required for the Major in Chemistry		55
Total Credit Hours Required for the BA Degree with a Major in Chemistry		120

Degree Requirements

Code	Title	Credit Hours
Core Requirements		
General Chemistry ¹		
CHEM 121 & CHEM 123	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LABORATORY I	4
<i>Select 1 from the following:</i> 4		
CHEM 122 & CHEM 124	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LABORATORY II	
CHEM 201 & CHEM 205	ADVANCED TOPICS IN GENERAL CHEMISTRY and	
Chemistry Foundation Courses		
BIOS 301	BIOCHEMISTRY I ²	3
<i>Select 1 from the following:</i> 3		
CHEM 211 & CHEM 213	ORGANIC CHEMISTRY I and ORGANIC CHEMISTRY DISCUSSION I	
CHEM 219	ORGANIC CHEMISTRY I HONORS	
CHEM 330	ANALYTICAL CHEMISTRY	3
CHEM 360	INORGANIC CHEMISTRY	3
<i>Select 2 courses from the following:</i> 6		
BIOS 352	PHYSICAL CHEMISTRY FOR THE BIOSCIENCES	
CHEM 301	PHYSICAL CHEMISTRY I	
CHEM 302	PHYSICAL CHEMISTRY II	
Mathematics ³		
MATH 101 or MATH 105	SINGLE VARIABLE CALCULUS I AP/OTH CREDIT IN CALCULUS I	3
MATH 102 or MATH 106	SINGLE VARIABLE CALCULUS II AP/OTH CREDIT IN CALCULUS II	3
MATH 212	MULTIVARIABLE CALCULUS ⁴	3
Physics		
<i>Select 1 from the following:</i> ⁵ 4		
PHYS 101 & PHYS 103	MECHANICS (WITH LAB) and MECHANICS DISCUSSION	
PHYS 111	HONORS MECHANICS (WITH LAB)	
PHYS 125	GENERAL PHYSICS (WITH LAB)	
<i>Select 1 from the following:</i> ⁶ 4		
PHYS 102 & PHYS 104	ELECTRICITY & MAGNETISM (WITH LAB) and ELECTRICITY AND MAGNETISM DISCUSSION	
PHYS 112	HONORS ELECTRICITY & MAGNETISM (WITH LAB)	
PHYS 126	GENERAL PHYSICS II (WITH LAB)	
Advanced Laboratories		
<i>Select 3 courses from the following:</i> 6		
BIOS 311	EXPERIMENTAL BIOCHEMISTRY	
CHEM 365	ORGANIC CHEMISTRY LAB	
CHEM 366	INORGANIC CHEMISTRY LAB	
CHEM 367	MATERIALS CHEMISTRY LAB	
CHEM 368	CHEMICAL MEASUREMENT LAB	
Elective Requirements		

Select 2 courses from the following:⁷

BIOS 302	BIOCHEMISTRY II	6
CHEM 313 & CHEM 314	ORGANIC CHEMISTRY II and ORGANIC CHEMISTRY DISCUSSION II	
	or CHEM 320ORGANIC CHEMISTRY II HONORS	
Any lecture course between CHEM 400 and CHEM 489		
Any lecture course between CHEM 495 and CHEM 699		
Total Credit Hours Required for the Major in Chemistry		55
Additional Credit Hours to Complete Degree Requirements*		34
University Graduation Requirements (https://ga.rice.edu/undergraduate-students/academic-policies-procedures/graduation-requirements/) [*]		31
Total Credit Hours		120

Footnotes and Additional Information

* **Note:** University Graduation Requirements include 31 credit hours, comprised of Distribution Requirements (Groups I, II, and III), FWIS, and LPAP coursework. In some instances, courses satisfying FWIS or distribution requirements may additionally meet other requirements, such as the Analyzing Diversity (AD) requirement, or some of the student's declared major, minor, or certificate requirements. Additional Credit Hours to Complete Degree Requirements include general electives, coursework completed as upper-level, residency (hours taken at Rice), and/or any other additional academic program requirements.

¹ CHEM 111 may be substituted for CHEM 121; CHEM 113 may be substituted for CHEM 123; CHEM 112 may be substituted for CHEM 122; CHEM 114 may be substituted for CHEM 124.

² Chemistry students may enroll in BIOS 301 without the prerequisite BIOS 201. Requests to waive the prerequisite course are approved by the course instructor. Students should contact the course instructor for more information.

³ Though not required, MATH 211 **is strongly recommended** for students planning to specialize in Physical and Theoretical chemistry or planning to pursue graduate studies. Additionally, the Department of Mathematics may, after consultation with students concerning their previous math preparation, recommend that a student be placed into a higher level math course than that for which the student has received official credit. The Department of Chemistry will accept this substitution of the math classes upon a written confirmation of the substitution from the Department of Mathematics and upon the student's successful completion of the higher level math course.

⁴ MATH 221 and MATH 222 may substitute for MATH 212.

⁵ The Chemistry department has determined that credit awarded for PHYS 141 *CONCEPTS IN PHYSICS I* is not eligible for meeting the requirements of the Chemistry major.

⁶ The Chemistry department has determined that credit awarded for PHYS 142 *CONCEPTS IN PHYSICS II* is not eligible for meeting the requirements of the Chemistry major.

⁷ For the purposes of this requirement, "advanced coursework" includes chemistry lecture courses at the 400-level or higher (courses in Rice's course catalog that have a course type listed as "lecture"). The courses CHEM 313 & CHEM 314, CHEM 320, or BIOS 302 count as "advanced coursework" for purposes of this requirement. Courses in other departments with substantial chemistry content may count toward this requirement with approval of the Director of the Undergraduate Program.

Policies for the BA Degree with a Major in Chemistry

Program Restrictions and Exclusions

Students pursuing the BA Degree with a Major in Chemistry should be aware of the following program restriction:

- As noted in Majors, Minors, and Certificates (<https://ga.rice.edu/undergraduate-students/academic-opportunities/majors-minors-certificates/>), under *Declaring Majors, Minors and Certificates*, students may not obtain both a BA and a BS in the same major. Students pursuing the BA Degree with a Major in Chemistry may not additionally pursue the BS Degree with a Major in Chemistry.

Transfer Credit

For Rice University's policy regarding transfer credit, see Transfer Credit (<https://ga.rice.edu/undergraduate-students/academic-policies-procedures/transfer-credit/>). Some departments and programs have additional restrictions on transfer credit. The Office of Academic Advising maintains the university's official list of transfer credit advisors (<https://oaa.rice.edu/advising-network/transfer-credit-advisors/>) on their website: <https://oaa.rice.edu>. Students are encouraged to meet with their academic program's transfer credit advisor when considering transfer credit possibilities.

Departmental Transfer Credit Guidelines

Students pursuing the major in Chemistry should be aware of the following departmental transfer credit guidelines:

- Requests for transfer credit will be considered by the program director (and/or the program's official transfer credit advisor) on an individual case-by-case basis. Please see the *Transfer Credit* tab on the department website (<https://chemistry.rice.edu/transfer-credit/>) for more information.

Additional Information

For additional information, please see the Chemistry website: <https://chemistry.rice.edu>

Opportunities for the BA Degree with a Major in Chemistry

Academic Honors

The university recognizes academic excellence achieved over an undergraduate's academic history at Rice. For information on university honors, please see Latin Honors (<https://ga.rice.edu/undergraduate-students/honors-distinctions/university/>) (*summa cum laude*, *magna cum laude*, and *cum laude*) and Distinction in Research and Creative Work (<https://ga.rice.edu/undergraduate-students/honors-distinctions/university/>). Some departments have department-specific Honors awards or designations.

Additional Information

For additional information, please see the Chemistry website: <https://chemistry.rice.edu>