

# CHEMISTRY, BACHELOR OF SCIENCE

## Chemistry Major Requirements

(Also see Requirements for a Bachelor's Degree. (<https://e-catalogue.jhu.edu/ksas-wse/undergraduate-policies/academic-policies/requirements-bachelors-degree/>))

Lecture and laboratory courses should be taken in sequence. In particular, AS.030.228 Intermediate Organic Chemistry Laboratory must be taken before AS.030.356 Advanced Inorganic Lab. Courses taken at another institution that are not directly equivalent to a JHU course may not apply towards these requirements without permission of the Director of Undergraduate Studies.

To allow maximum flexibility in choosing electives, students should complete both physics and organic chemistry by the end of the sophomore year. A biochemistry course AS.020.305 (<https://e-catalogue.jhu.edu/search/?P=AS.020.305>) Biochemistry or AS.250.315 (<https://e-catalogue.jhu.edu/search/?P=AS.250.315>) Biochemistry I and Quantitative Analysis Laboratory AS.030.245 (<https://e-catalogue.jhu.edu/search/?P=AS.030.245>) are required for an American Chemical Society accredited degree. The in-depth courses that are required for the ACS degree are Organic Chemistry II AS.030.206 (<https://e-catalogue.jhu.edu/search/?P=AS.030.206>), Quantitative Analysis AS.030.245 (<https://e-catalogue.jhu.edu/search/?P=AS.030.245>), Physical Chemistry II AS.030.301 (<https://e-catalogue.jhu.edu/search/?P=AS.030.301>). Both AS.030.206 and AS.030.301 are required for the major.

Majors must complete all courses required for the major for a letter grade and receive a grade of C- or higher.

### Writing in the Major

Students must complete at least 6 credits of Writing and Communication Foundational Ability coursework in one major. For this major, students would be able to fulfill this requirement by completing AS.030.356 Advanced Inorganic Lab, a required 3 credit course of the major, and by selecting one of their electives (at least 3 credits) for the major that is designated as a Writing and Communications course.

Requirements of the chemistry major are:

Code	Title	Credits
<b>Core Courses</b>		
AS.030.101 & AS.030.105	Introductory Chemistry I and Introductory Chemistry Laboratory I	4
AS.030.102 & AS.030.106	Introductory Chemistry II and Introductory Chemistry Laboratory II	4
or AS.030.103	Applied Chemical Equilibrium and Reactivity w/lab	
AS.030.205	Introductory Organic Chemistry I	4
AS.030.206	Organic Chemistry II	4
or AS.030.212	Honors Organic Chemistry II	
AS.030.227	Chemical Chirality: An Introduction in Organic Chem. Lab, Techniques <sup>1</sup>	3
or AS.030.225	Introductory Organic Chemistry Laboratory	
AS.030.228	Intermediate Organic Chemistry Laboratory	3
AS.030.301	Physical Chemistry I	3

AS.030.302	Physical Chemistry II	3
AS.030.449	Chemistry of Inorganic Compounds <sup>2</sup>	3
AS.030.356	Advanced Inorganic Lab	3
Select two Lab Courses from the following:		6
AS.030.245	Quantitative Analytical Laboratory	
AS.030.305	Physical Chemistry Instrumentation Laboratory I	
AS.030.306	Physical Chemistry Instrumentation Laboratory II	

### Courses Outside the Department

AS.171.101	General Physics: Physical Science Major I	4
or AS.171.103	General Physics I for Biological Science Majors	
or AS.171.105	Classical Mechanics I	
or AS.171.107	General Physics for Physical Sciences Majors (AL)	
AS.173.111	General Physics Laboratory I	1
or AS.173.115	Classical Mechanics Laboratory	
AS.171.102	General Physics: Physical Science Major II	4
or AS.171.104	General Physics/Biology Majors II	
or AS.171.106	Electricity and Magnetism I	
or AS.171.108	General Physics for Physical Science Majors (AL)	
AS.173.112	General Physics Laboratory II	1
or AS.173.116	Electricity and Magnetism Laboratory	
AS.110.108	Calculus I (Physical Sciences & Engineering)	4
or AS.110.106	Calculus I (Biology and Social Sciences)	
AS.110.109	Calculus II (For Physical Sciences and Engineering)	4
or AS.110.107	Calculus II (For Biological and Social Science)	
or AS.110.113	Honors Single Variable Calculus	

### Advanced Elective Courses

Three credits of advanced chemistry courses beyond AS.030.305-AS.030.306 <sup>3</sup>	3
Nine credits of advanced chemistry courses, or science electives at the 300-level or higher approved by a Department of Chemistry advisor, and/or mathematics beyond Calculus II <sup>4</sup>	9

**Total Credits** 70

<sup>1</sup> Fall semester of AS.030.227 Chemical Chirality: An Introduction in Organic Chem. Lab, Techniques restricted to Chemistry majors.

<sup>2</sup> Course must be completed before AS.030.356 Advanced Inorganic Lab.

<sup>3</sup> None of the advanced course requirements may be fulfilled with research. Courses numbered between AS.030.307 and AS.030.499 apply here, along with biochemistry course offerings AS.020.305 and AS.250.315.

<sup>4</sup> Any graded course worth 3 credits or more at the 300- or 400-level in the following departments will fulfill this requirement: Biology (020), Biophysics (250), Chemistry (030), Earth and Planetary Sciences (270), Neuroscience (080), and Physics (171). It also includes AS.280.3xx-4xx courses with area designators N or Q and Math (AS.110) or Applied Math and Statistics (EN.553) courses at the 200- through 400-level.

Students must complete at least 6 credits of Writing and Communication foundational ability coursework in one major. For this major, students would be able to fulfill this requirement by completing AS.030.356 Advanced Inorganic Lab, a required 3 credit course of the major, and by selecting one of their electives (at least 3 credits) for the major that is designated as a Writing and Communications course.

Lecture and laboratory courses should be taken in sequence. In particular, AS.030.228 Intermediate Organic Chemistry Laboratory must be taken before AS.030.356 Advanced Inorganic Lab. Courses taken at another institution that are not directly equivalent to a JHU course may not apply towards these requirements without permission of the Director of Undergraduate Studies.

To allow maximum flexibility in choosing electives, students should complete both physics and organic chemistry by the end of the sophomore year. A biochemistry course AS.020.305 (<https://e-catalogue.jhu.edu/search/?P=AS.020.305>) Biochemistry or AS.250.315 (<https://e-catalogue.jhu.edu/search/?P=AS.250.315>) Biochemistry I and Quantitative Analysis Laboratory AS.030.245 (<https://e-catalogue.jhu.edu/search/?P=AS.030.245>) are required for an American Chemical Society accredited degree. The in-depth courses that are required for the ACS degree are Organic Chemistry II AS.030.206 (<https://e-catalogue.jhu.edu/search/?P=AS.030.206>), Quantitative Analysis AS.030.245 (<https://e-catalogue.jhu.edu/search/?P=AS.030.245>), Physical Chemistry II AS.030.301 (<https://e-catalogue.jhu.edu/search/?P=AS.030.301>). Both AS.030.206 and AS.030.301 are required for the major.

## Sample Program of Study

A typical program might include the following sequence of courses:

### First Year

First Semester	Credits	Second Semester	Credits
AS.030.101	3	AS.030.102	3
AS.030.105	1	AS.030.106	1
AS.110.106	4	AS.110.107	4
	<b>8</b>		<b>8</b>

### Second Year

First Semester	Credits	Second Semester	Credits
AS.030.205	4	AS.030.206	4
AS.030.225 or 227	3	AS.030.228	3
AS.171.101, 103, or 107	4	AS.171.102, 104, or 108	4
AS.173.111	1	AS.173.112	1
	<b>12</b>		<b>12</b>

### Third Year

First Semester	Credits	Second Semester	Credits
AS.030.301	3	AS.030.302	3
Additional Chemistry Lab #1	3	Additional Chemistry Lab #2	3
Science or math elective	3	Science or math elective	3
	<b>9</b>		<b>9</b>

### Fourth Year

First Semester	Credits	Second Semester	Credits
AS.030.449	3	AS.030.356	3
Additional Chemistry Lab #2 (if not taken in the previous year)	3	Science or math elective	3
Upper level chemistry elective	2		
	<b>8</b>		<b>6</b>

**Total Credits 72**

## Honors in Chemistry

To recognize exceptional performance, both in formal course work and in research, chemistry majors can receive a degree with honors. Honors in Chemistry may be achieved by one of two paths. 1: A student with a GPA of 3.75 or higher in (N) and (Q) courses or 2: A student with a 3.5 GPA in (N) and (Q) courses and with at least 2 semesters of research with a Chemistry faculty member or an approved advisor. These students must write a summary of their research and fill out the Honors Clearance form and the GPA worksheet (see: <https://advising.jhu.edu/student-roadmap/seniors/honors/>). Turn in these forms to the Director of Undergraduate Studies.