

Chemistry BS

Overview

The Department of Chemistry is one of the oldest departments in the university and has a long record of preparing students for careers in science. Since a significant portion of America's chemical industry is centered in the Philadelphia region, there is a wide range of career opportunities locally available. Although most of our students have gone on to medicine, dentistry or the chemical industry, recent graduates have also gone on to careers in law, forensics and even art restoration.

The **Bachelor of Science in Chemistry** prepares students for excellence in graduate or medical school, and employment in the chemical, biotechnological or pharmaceutical industries. Students learn a wide array of topics in chemistry, mathematics and physics. The program emphasizes the "hands-on" nature of chemistry in laboratory courses, giving students the tools that chemists need to pursue research. They also learn how to write scientific reports, analyze data and place these results in a broader scientific context. Accomplished majors are encouraged to pursue independent research with a professor, and to present their work internally and at national meetings.

Campus Location: Main

Program Code: ST-CHEM-BS

Distinction in Major

To graduate with distinction in this major, a student must have a minimum 3.33 GPA in all the Chemistry courses required for the major.

Accelerated Programs

Accelerated programs provide a pathway for students to pursue both an undergraduate degree and an advanced degree in a shorter amount of time. Below is a list of available accelerated programs for students in the BS in Chemistry.

- BS in Chemistry / MEd in Middle Grades Education with a Concentration in Science
- BS in Chemistry / MEd in Middle Grades Education with a Concentration in Mathematics and Science
- BS in Chemistry / MS in Chemistry
- BA or BS in Chemistry / PSM in Forensic Chemistry

Undergraduate Contact Information

Ann Valentine, Chair
Beury Hall, Room 130
215-204-7118
ann.valentine@temple.edu

Vince Voelz, Vice Chair
Beury Hall, Room 240
215-204-1973
vincent.voelz@temple.edu

Steven Fleming, Faculty Advisor (Last names A-C)
Beury Hall, Room 446
215-204-0359
sfleming@temple.edu

Roy Keyer, Faculty Advisor (Last names D-G)
Beury Hall, Room 440
215-204-7286
roy.keyer@temple.edu

Dan Strongin, Faculty Advisor (Last names H-K)
Beury Hall, Room 246
215-204-7119
dstrongi@temple.edu

Jonathan Smith, Faculty Advisor (Last names L-O)
Beury Hall, Room 213
215-204-2252
jmsmith1@temple.edu

Vladi Wilent, Faculty Advisor (Last names P-S)
 Beury Hall, Room 344
 215-204-7186
 vladi.wilent@temple.edu

Graham Dobereiner, Faculty Advisor (Last names T-Z)
 Beury Hall, Room 342
 215-204-3185
 dob@temple.edu

Daniele Ramella, Faculty Advisor (Undergraduate research)
 Beury Hall, Room 126B
 215-204-1931
 daniele.ramella@temple.edu

Learn more about the Bachelor of Science in Chemistry.

These requirements are for students who matriculated in academic year 2023-2024. Students who matriculated prior to fall 2023 should refer to the Archives to view the requirements for their Bulletin year.

Bachelor of Science Requirements

Summary of Requirements for the Degree

1. University Requirements (123 total s.h.)

- Students must complete all University requirements including those listed below.
- All undergraduate students must complete at least two writing-intensive courses for a total of at least six credits at Temple as part of their major. The specific writing-intensive course options for this major are:

Code	Title	Credit Hours
BIOL 2297	Research Techniques in Genetics (S)	3
BIOL 3396	Scientific Writing for Biology: The Art of Communicating	3
CHEM 3398	Physical Chemistry Laboratory II	2
CHEM 4196	Techniques of Chemical Measurement II	5
CHEM 4496	Research Techniques in Biochemistry	4
EES 2096	Climate Change: Oceans To Atmosphere (S - even years)	4
MATH 3098	Modern Algebra (F)	3
MATH 4096	Senior Problem Solving	3
PHYS 2796	Introduction to Modern Physics (S)	4
or PHYS 4796	Experimental Physics	

- Students must complete the General Education (GenEd) requirements.
 - See the General Education section of the *Undergraduate Bulletin* for the GenEd curriculum.
 - Students who complete CST majors receive a waiver for 2 Science & Technology (GS) and 1 Quantitative Literacy (GQ) GenEd courses.
- Students must satisfy general Temple University residency requirements.

2. College Requirements

- A minimum of 90 total credits within the College of Science & Technology (CST), the College of Liberal Arts (CLA), and/or the College of Engineering (ENG).
 - A minimum of 45 of these credits must be upper-level (courses numbered 2000 and above).
- Complete a one-credit first-year or transfer seminar.
 - SCTC 1001 CST First Year Seminar for every entering first-year CST student.
 - SCTC 2001 CST Transfer Seminar for every entering transfer CST student.

3. Major Requirements for Bachelor of Science (70-74 s.h.)

At least 9 courses required for the major must be completed at Temple. At least 7 Chemistry courses must be completed at Temple.

4. American Chemical Society (ACS) Certification Requirements (optional, see Footnote 2 below for more details)

- A foundational course in each of the 5 areas of chemistry (analytical, biochemistry, inorganic, organic, and physical). General chemistry courses do not count as foundational courses.

- In-depth courses in at least 4 of the 5 areas, where an in-depth course is defined as a second semester of study in that particular area. For example, CHEM 2202 Organic Chemistry II qualifies as an in-depth course in organic chemistry.
- 400 laboratory hours.

Code	Title	Credit Hours
Chemistry		
Select one of the following:		4
CHEM 1031 & CHEM 1033	General Chemistry I and General Chemistry Laboratory I	
CHEM 1951 & CHEM 1953	Honors General Chemical Science I and Honors Chemical Science Laboratory I (F)	
Select one of the following:		4
CHEM 1032 & CHEM 1034	General Chemistry II and General Chemistry Laboratory II	
CHEM 1952 & CHEM 1954	Honors General Chemical Science II and Honors Chemical Science Laboratory II (S)	
Select one of the following:		4
CHEM 2201 & CHEM 2203	Organic Chemistry I and Organic Chemistry Laboratory I	
CHEM 2211 & CHEM 2213	Organic Chemistry for Majors I and Organic Majors Laboratory I (F)	
CHEM 2921 & CHEM 2923	Organic Chemistry for Honors I and Organic Honors Laboratory I (F)	
Select one of the following:		4
CHEM 2202 & CHEM 2204	Organic Chemistry II and Organic Chemistry Laboratory II	
CHEM 2212 & CHEM 2214	Organic Chemistry for Majors II and Organic Majors Laboratory II (S)	
CHEM 2922 & CHEM 2924	Organic Chemistry for Honors II and Organic Honors Laboratory II (S)	
CHEM 3001	Inorganic Chemistry	3
CHEM 3103 & CHEM 3105	Techniques of Chemical Measurement I and Introduction to Chemical Research Techniques	4
CHEM 3301	Physical Chemistry Lecture I	3
CHEM 3302	Physical Chemistry Lecture II	3
CHEM 3303	Physical Chemistry Laboratory I	2
CHEM 3398	Physical Chemistry Laboratory II	2
CHEM 4196	Techniques of Chemical Measurement II	5
Two Advanced Chemistry courses (4002 or above) ^{1,2}		6-8
Two Advanced Science courses - select from the following: ²		6-8
CHEM 2891	Introduction to Undergraduate Research ³	
CHEM 3881	Cooperative Research ³	
CHEM 3891	Undergraduate Research ³	
CHEM 4881	Cooperative Research ³	
CHEM 4891	Undergraduate Research ³	
All other Chemistry courses numbered 4002 and above		
BIOL 2207 & BIOL 2297	Genetics and Research Techniques in Genetics ⁴	
BIOL 3204	Cell Structure and Function (F)	
BIOL 3265	Developmental Biology (F)	
BIOL 3334	Mammalian Physiology	
All other Biology courses numbered above 3334		
EES 2011	Mineralogy I	

All other EES courses numbered above 2011

MATH 2101 Linear Algebra

MATH 3031 Probability Theory I

All other Math courses numbered above 3031

PHYS 2101 Classical Mechanics (S)

PHYS 2502 Mathematical Physics (S)

PHYS 2796 Introduction to Modern Physics (S)

PHYS 3101 Analytical Mechanics (F)

PHYS 3301 Electricity and Magnetism (F)

PHYS 3302 Classical Electromagnetism (S)

PHYS 4101 Thermal Physics (F)

PHYS 4301 Electronics

All other Physics courses numbered above 4301

Mathematics

MATH 1041 Calculus I 4

or MATH 1941 Honors Calculus I

MATH 1042 Calculus II 4

or MATH 1942 Honors Calculus II

MATH 2043 Calculus III 4

or MATH 2943 Honors Calculus III

Physics

Select one of the following: 4

PHYS 1061 Elementary Classical Physics I

PHYS 1961 Honors Elementary Classical Physics I (F)

PHYS 2021 General Physics I

PHYS 2921 Honors General Physics I (F)

Select one of the following 4

PHYS 1062 Elementary Classical Physics II

PHYS 1962 Honors Elementary Classical Physics II (S)

PHYS 2022 General Physics II

PHYS 2922 Honors General Physics II (S)

Total Credit Hours 70-74

Code	Title	Credit Hours
------	-------	--------------

(F) - Fall only course

(S) - Spring only course

1

CHEM 4881 and CHEM 4891 will not fulfill an Advanced Chemistry elective for the Chemistry BA or BS degree.

2

There are several course choices that can be used to meet the ACS certification requirements. See an advisor if you have any questions. The most straightforward pathway is for students to take the elective courses CHEM 4401 Biochemistry I and CHEM 4003 Inorganic Synthesis. Alternately, students could take CHEM 4401 Biochemistry I and CHEM 4002 Advanced Inorganic Chemistry, but this pathway would require additional lab courses (see a Chemistry faculty advisor). Another option is for students to take the elective courses CHEM 4401 Biochemistry I and CHEM 4196 Techniques of Chemical Measurement II or BIOL 4344 Research Techniques in Biochemistry. In order to fulfill the ACS-mandated requirement of 400 laboratory hours, students must complete either CHEM 4207 Synthesis and Identification of Organic and Medicinal Compounds OR any two (2) of the following: CHEM 3881 Cooperative Research and/or CHEM 3891 Undergraduate Research, CHEM 4004 Crystallography and Diffraction, CHEM 4103 Instrumental Design, CHEM 4107 Drug Analysis, CHEM 4108 Investigative Chemistry, or CHEM 4503 Introduction to Polymer Chemistry.

3

One advanced science course, for a total of 4 credits, may be satisfied by a total of 4 credits of any combination of CHEM 2891, CHEM 3881, CHEM 3891, CHEM 4881, or CHEM 4891. No more than 1 credit of CHEM 2891 may be used toward this total. The research courses may only be used as one advanced science course.

4

BIOL 2207 and BIOL 2297 are co-requisites to each other.

Suggested Academic Plan

All prospective majors should schedule an appointment with one of the departmental advisors (names of current faculty advisors are available in the Overview section) to plan a program of study. The recommended order of courses for the major is listed below; a different order is acceptable as long as the student adheres to prerequisite requirements.

Bachelor of Science in Chemistry

Suggested Plan for New Students Starting in the 2023-2024 Academic Year

Year 1		Credit Hours
Fall		
Select one of the following:		4
CHEM 1031 & CHEM 1033	General Chemistry I and General Chemistry Laboratory I	
CHEM 1951 & CHEM 1953	Honors General Chemical Science I and Honors Chemical Science Laboratory I (F)	
MATH 1041 or MATH 1941	Calculus I or Honors Calculus I	4
SCTC 1001	CST First Year Seminar	1
ENG 0802 or ENG 0812 or ENG 0902	Analytical Reading and Writing or Analytical Reading and Writing: ESL or Honors Writing About Literature	4
Elective		2
Credit Hours		15
Spring		
Select one of the following:		4
CHEM 1032 & CHEM 1034	General Chemistry II and General Chemistry Laboratory II	
CHEM 1952 & CHEM 1954	Honors General Chemical Science II and Honors Chemical Science Laboratory II (S)	
MATH 1042 or MATH 1942	Calculus II or Honors Calculus II	4
IH 0851 or IH 0951	Intellectual Heritage I: The Good Life or Honors Intellectual Heritage I: The Good Life	3
Electives		5
Credit Hours		16
Year 2		
Fall		
Select one of the following:		4
CHEM 2201 & CHEM 2203	Organic Chemistry I and Organic Chemistry Laboratory I	
CHEM 2211 & CHEM 2213	Organic Chemistry for Majors I and Organic Majors Laboratory I (F)	
CHEM 2921 & CHEM 2923	Organic Chemistry for Honors I and Organic Honors Laboratory I (F)	
Select one of the following:		4
PHYS 1061	Elementary Classical Physics I	
PHYS 1961	Honors Elementary Classical Physics I (F)	
PHYS 2021	General Physics I	
PHYS 2921	Honors General Physics I (F)	
MATH 2043 or MATH 2943	Calculus III or Honors Calculus III	4

IH 0852 or IH 0952	Intellectual Heritage II: The Common Good or Honors Intellectual Heritage II: The Common Good	3
Credit Hours		15
Spring		
Select one of the following:		4
CHEM 2202 & CHEM 2204	Organic Chemistry II and Organic Chemistry Laboratory II	
CHEM 2212 & CHEM 2214	Organic Chemistry for Majors II and Organic Majors Laboratory II (S)	
CHEM 2922 & CHEM 2924	Organic Chemistry for Honors II and Organic Honors Laboratory II (S)	
Select one of the following:		4
PHYS 1062	Elementary Classical Physics II	
PHYS 1962	Honors Elementary Classical Physics II (S)	
PHYS 2022	General Physics II	
PHYS 2922	Honors General Physics II (S)	
GenEd Breadth Course		3
Electives		5
Credit Hours		16
Year 3		
Fall		
CHEM 3103	Techniques of Chemical Measurement I ¹	3
CHEM 3105	Introduction to Chemical Research Techniques ¹	1
CHEM 3302	Physical Chemistry Lecture II	3
GenEd Breadth Course		3
GenEd Breadth Course		3
Elective		2
Credit Hours		15
Spring		
CHEM 3001	Inorganic Chemistry	3
CHEM 3301	Physical Chemistry Lecture I	3
CHEM 3398	Physical Chemistry Laboratory II	2
GenEd Breadth Course		3
Electives		5
Credit Hours		16
Year 4		
Fall		
CHEM 3303	Physical Chemistry Laboratory I	2
Advanced Chemistry Course - 4002 or above ^{2,3}		3-4
Advanced Science Course ³		3-4
GenEd Breadth Course		3-4
Elective		4-1
Credit Hours		15
Spring		
CHEM 4196	Techniques of Chemical Measurement II	5
Advanced Chemistry Course - 4002 or above ^{2,3}		3-4
Advanced Science Course ³		3-4
Elective		4-2
Credit Hours		15
Total Credit Hours		123

2

Advanced Chemistry Courses for B.S. students consist of all courses in Chemistry having a number of 4002 or above (except CHEM 4881 and CHEM 4891). If the student has successfully completed the appropriate prerequisite course, a graduate course in Chemistry may be included in this category.

3

There are several course choices that can be used to meet the ACS certification requirements. See an advisor if you have any questions. The most straightforward pathway is for students to take the elective courses CHEM 4401 Biochemistry I and CHEM 4003 Inorganic Synthesis. Alternately, students could take CHEM 4401 Biochemistry I and CHEM 4002 Advanced Inorganic Chemistry, but this pathway would require additional lab courses (see a Chemistry faculty advisor). Another option is for students to take the elective courses CHEM 4401 Biochemistry I and CHEM 4196 Techniques of Chemical Measurement II or BIOL 4344 Research Techniques in Biochemistry. In order to fulfill the ACS-mandated requirement of 400 laboratory hours, students must complete either CHEM 4207 Synthesis and Identification of Organic and Medicinal Compounds OR any two (2) of the following: CHEM 3881 Cooperative Research and/or CHEM 3891 Undergraduate Research, CHEM 4004 Crystallography and Diffraction, CHEM 4103 Instrumental Design, CHEM 4107 Drug Analysis, CHEM 4108 Investigative Chemistry, or CHEM 4503 Introduction to Polymer Chemistry.

Advanced Science Courses for BS students consist of:

Code	Title	Credit Hours
Advanced Science Courses		6-8
Only one Advanced Science course may be satisfied by a total of 4 credits in any combination of the following:		4
CHEM 2891	Introduction to Undergraduate Research ¹	
CHEM 3881	Cooperative Research	
CHEM 3891	Undergraduate Research	
CHEM 4881	Cooperative Research	
CHEM 4891	Undergraduate Research	
All other Chemistry courses numbered 4002 or above		3-4
BIOL 2296	Genetics (S)	4
BIOL 3096	Cell Structure and Function (F)	4
BIOL 3265	Developmental Biology (F)	3
BIOL 3334	Mammalian Physiology	4
All other Biology courses numbered above 3334		3-4
EES 2011	Mineralogy I	4
All other EES courses numbered above 2011		3-4
MATH 2101	Linear Algebra	3
MATH 3031	Probability Theory I	3
All other Math courses numbered above 3031		3-4
PHYS 2101	Classical Mechanics (S)	3
PHYS 2502	Mathematical Physics (S)	4
PHYS 2796	Introduction to Modern Physics (S)	4
PHYS 3101	Analytical Mechanics (F)	3
PHYS 3301	Electricity and Magnetism (F)	4
PHYS 3302	Classical Electromagnetism (S)	3
PHYS 4101	Thermal Physics (F)	3
PHYS 4301	Electronics	3
All other Physics courses numbered above 4301		3-4
Code	Title	Credit Hours
(F) - Fall only course		
(S) - Spring only course		

1

No more than one credit of CHEM 2891 may be used toward this total.