Chemistry, B.S.

Learn more about the Bachelor of Science in Chemistry (https://www.temple.edu/academics/degree-programs/chemistry-major-st-chem-bs).

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.

Undergraduate Contact Information:

Dr. Dan Strongin, Chair
Beury Hall, Room 130
215-204-7118

Dr. Ann Valentine, Vice Chair
Beury Hall, Room 352
215-204-7118

Dr. Steven Fleming, Faculty Advisor (Last names A-C)
Beury Hall, Room 344
215-204-0359
sfleming@temple.edu

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

Dr. Spiridoula Matsika, Faculty Advisor (Last names H-K)
Beury Hall, Room 242
215-204-7703
spiridoula.matsika@temple.edu

Dr. Andrew Price, Faculty Advisor (Last names L-M)
Beury Hall, Room 222C
215-204-1048
acprice@temple.edu

Dr. Vince Voelz, Faculty Advisor (Last names N-R)
Beury Hall, Room 240
215-204-1973
vincent.voelz@temple.edu

Dr. Vladi Wilent, Faculty Advisor (Last names S-T)
Beury Hall, Room 440
215-204-7186
vladi.wilent@temple.edu

Dr. Michael Zdilla, Faculty Advisor (Last names U-Z)
SERC, Room 656
215-204-7886
michael.zdilla@temple.edu
Note: Due to restricted access to the 6th floor of SERC, please email Dr. Zdilla to set up an appointment.

Bachelor of Science

Summary of Requirements for the Degree

1. University Requirements (123 total s.h.)
   - MATH 0701 (4 s.h.) and/or ENG 0701 (4 s.h.), if required by placement testing.
   - All Temple students must take a minimum of two writing-intensive courses at Temple as part of their major. Following is a list of courses that can be used to satisfy the writing-intensive requirement:

Code	Title	Credit Hours
BIOL 2296	Genetics (S)	4
BIOL 3096	Cell Structure and Function (F)	4
BIOL 3396	Scientific Writing for Biology: The Art of Communicating	3
CHEM 4196	Techniques of Chemical Measurement II	5
CHEM 3397 & CHEM 3398	Physical Chemistry Laboratory I and Physical Chemistry Laboratory II	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 (http://bulletin.temple.edu/undergraduate/general-education) section of the *Undergraduate Bulletin* for the GenEd curriculum.
     - Students who complete CST majors typically receive a waiver for 2 Science & Technology (GS) and 1 Quantitative Literacy (GQ) GenEd courses.
   - Students must satisfy general Temple University residency requirements (http://bulletin.temple.edu/undergraduate/academic-policies/academic-residency-requirements).
2. College Requirements
   - 45 Upper Level (2000+) credits within the College of Science & Technology (CST) or the College of Liberal Arts (CLA).
   - 90 credits within the College of Science & Technology (CST) or the College of Liberal Arts (CLA).
   - First Year Seminar Requirement: All students in the College of Science & Technology (CST) are required to take a 1 credit first year seminar course, SCTC 1001 CST First Year Seminar. Other courses that fulfill this requirement may be found on the CST College Requirements (http://bulletin.temple.edu/undergraduate/science-technology/#collegerequirementstext) page. Only one course in this category may count towards graduation.
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 3397 & CHEM 3398	Physical Chemistry Laboratory I and Physical Chemistry Laboratory II	4
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 2296	Genetics (S)	
BIOL 3096	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 B.A. or B.S. 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 BIOL 4344 Research Techniques in Biochemistry. In order to fulfill the ACS-mandated requirement of 400 laboratory hours, students must complete either CHEM 4207 Advanced Organic Preparations 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.

Calculation of Major GPA

Courses listed under the major requirements for the degree will be included in the calculation of the major GPA. Courses that could not apply toward the major as an elective or required course would not be counted in the calculation of the major GPA. This would include CHEM 1027, for example.

Distinction in Major

To graduate with Distinction in Major, students are required to achieve a 3.33 GPA or higher in all the Chemistry courses in their major.

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 About 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

Requirements for New Students starting in the 2019-2020 Academic Year

Year 1		
Fall		**Credit Hours**
Select one of the following:		4
CHEM 1031 & CHEM 1033	General Chemistry I	
CHEM 1951 & CHEM 1953	Honors General Chemical Science I (F)	
MATH 1041 or 1941	Calculus I	4
SCTC 1001	CST First Year Seminar	1
General Education/Elective Credits		6
	Term Credit Hours	15
Spring		
Select one of the following:		4
CHEM 1032 & CHEM 1034	General Chemistry II	
CHEM 1952 & CHEM 1954	Honors General Chemical Science II (S)	
MATH 1042 or 1942	Calculus II	4
General Education/Elective Credits		8
	Term Credit Hours	16
Year 2		
Fall		
Select one of the following:		4
CHEM 2201 & CHEM 2203	Organic Chemistry I	
CHEM 2211 & CHEM 2213	Organic Chemistry for Majors I (F)	
CHEM 2921 & CHEM 2923	Organic Chemistry for Honors 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 2943	Calculus III	4
General Education/Elective Credits		3
	Term Credit Hours	15
Spring		
Select one of the following:		4
CHEM 2202 & CHEM 2204	Organic Chemistry II	
CHEM 2212 & CHEM 2214	Organic Chemistry for Majors II (S)	
CHEM 2922 & CHEM 2924	Organic Chemistry for Honors 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)	

General Education/Elective Credits		8
	Term 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 3301	Physical Chemistry Lecture I	3
General Education/Elective Credits		8
	Term Credit Hours	15
Spring		
CHEM 3302	Physical Chemistry Lecture II	3
CHEM 3397	Physical Chemistry Laboratory I [WI]	2
CHEM 3001	Inorganic Chemistry	3
General Education/Elective Credits		8
	Term Credit Hours	16
Year 4		
Fall		
CHEM 3398	Physical Chemistry Laboratory II [WI]	2
Advanced Chemistry Course - 4002 or above[2,3]		3-4
Advanced Science Course[3]		3-4
General Education/Elective Credits		7-5
	Term Credit Hours	15
Spring		
CHEM 4196	Techniques of Chemical Measurement II [WI]	5
Advanced Chemistry Course - 4002 or above[2,3]		3-4
Advanced Science Course[3]		3-4
General Education/Elective Credits		4-2
	Term Credit Hours	15
	Total Credit Hours:	123

1 It is strongly encouraged that CHEM 3103/CHEM 3105 be taken before all chemistry laboratory courses numbered above 3105.

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 BIOL 4344 Research Techniques in Biochemistry. In order to fulfill the ACS-mandated requirement of 400 laboratory hours, students must complete either CHEM 4207 Advanced Organic Preparations 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 B.S. 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.