

Biochemistry 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 Biochemistry** 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 biology, chemistry, mathematics and physics. In upper-division studies, Biochemistry majors learn to apply biochemical principles to real-life situations via problem-based approaches in their courses. Laboratory courses give students the tools they will need as biochemists to pursue research. 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-BIOC-BS

Distinction in Major

To graduate with distinction in this major, a student must achieve a minimum 3.33 GPA in all the Biology and 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 Biochemistry.

- BS in Biochemistry / PSM in Bioinformatics and Biological Data Science
- BS in Biochemistry / PSM in Bioinnovation
- BS in Biochemistry / PSM in Biotechnology
- BS in Biochemistry / 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

Angela Bricker, Faculty Advisor (Biology)
 Biology-Life Sciences Building, Room 248C
 215-204-8578
 abricker@temple.edu

Learn more about the Bachelor of Science in Biochemistry.

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
CHEM 4196	Techniques of Chemical Measurement II	5
CHEM 4496	Research Techniques in Biochemistry	4

- 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 (79-83 s.h.)

At least 10 courses required for the major must be completed at Temple. At least 4 Biology and 4 Chemistry courses must be completed at Temple.

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 3103 & CHEM 3105	Techniques of Chemical Measurement I and Introduction to Chemical Research Techniques	4
CHEM 3405	Physical Chemistry of Biomolecules	3
CHEM 4401	Biochemistry I	3
CHEM 4496	Research Techniques in Biochemistry	4
Biology		
BIOL 1111 or BIOL 1911	Introduction to Organismal Biology Honors Introduction to Organismal Biology	4
Select one of the following:		4
BIOL 1112 or BIOL 1912	Introduction to Biomolecules, Cells and Genomes Honors Introduction to Biomolecules, Cells and Genomes	
BIOL 2112 or BIOL 2912	Introduction to Cellular and Molecular Biology Honors Introduction to Cellular and Molecular Biology	
BIOL 2207	Genetics (S)	3
BIOL 2297	Research Techniques in Genetics (S) ¹	3
BIOL 3204	Cell Structure and Function (F)	4
BIOL 3324	Molecular Biology (S)	3
BIOL 4376	General Biochemistry II (F)	3
Biochemistry Electives		
Select three of the following: ¹		9-13
BIOL 3113	Genome Analytics	
BIOL 3128	Genomics and Infectious Disease Dynamics (F)	
BIOL 3201	Human Genetics (F)	
BIOL 3212	Introduction to Bioinformatics and Computational Biology	
BIOL 3225	Evolutionary Genetics (S)	
BIOL 3232	Behavioral Genetics (F)	
BIOL 3243	Parasitology (Not offered every year)	
BIOL 3265	Developmental Biology (F)	
BIOL 3301	Advanced Cell Biology (S)	
BIOL 3317	General Microbiology (S)	
BIOL 3322	Biology of Plants (F)	
BIOL 3325	Research Techniques in Molecular Biology (S)	
BIOL 3327	Immunology (S)	
BIOL 3328	Virology (F)	
BIOL 3329	Developmental Genetics (Not offered every year)	
BIOL 3333	Advanced Techniques in Microscopy (S)	

BIOL 3334	Mammalian Physiology (S)	
BIOL 3352	Systems Neuroscience	
BIOL 3356	Organization and Development of the Nervous System (S)	
BIOL 3358	Cellular and Molecular Neuroscience (S)	
BIOL 3361	Molecular Neuropharmacology (Not offered every year)	
BIOL 3367	Endocrinology (F)	
BIOL 3368	Biology of Cancer (S)	
BIOL 3371	Cell Proliferation (S)	
BIOL 3373	Cell Signaling (S)	
BIOL 3374	Physical Biochemistry (S)	
BIOL 3379	Biotechnology (S)	
BIOL 3380	Contemporary Biology	
BIOL 3396	Scientific Writing for Biology: The Art of Communicating (S)	
BIOL 3403	Genomic Biology	
BIOL 4338	Epigenetics (Not offered every year)	
BIOL 4341	Genome Editing	
BIOL 4364	Biochemistry of Embryogenesis (F)	
BIOL 4365	Evolutionary Developmental Biology: Evo-Devo (S)	
BIOL 4366	Stem Cell Biology (F)	
BIOL 4375	General Biochemistry I (F)	
BIOL 4483	Accelerated Research in Biochemistry ²	
BIOL 4491	Research in Biochemistry ²	
CHEM 3001	Inorganic Chemistry	
CHEM 3301	Physical Chemistry Lecture I	
CHEM 3302	Physical Chemistry Lecture II	
CHEM 3881	Cooperative Research ²	
CHEM 3891	Undergraduate Research ²	
CHEM 4000-4800		
CHEM 4881	Cooperative Research ²	
CHEM 4891	Undergraduate Research ²	
MATH 2043	Calculus III	
or MATH 2943	Honors Calculus III	
Mathematics		
MATH 1041	Calculus I	4
or MATH 1941	Honors Calculus I	
MATH 1042	Calculus II	4
or MATH 1942	Honors Calculus II	
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**79-83**

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

(F) - Fall only course

(S) - Spring only course

1

This course has a co-requisite of BIOL 2207.

2

A minimum of 6 credits of these research courses, in any combination, may be used to fulfill one of the Biochemistry Electives.

Note: Grades of C- or higher are required unless otherwise specified in all courses for the major, including course prerequisites. Most research and Independent Study courses are not available for major credit, such as:

Code	Title	Credit Hours
BIOL 3091	Research Methods	3
BIOL 3681	Cooperative Studies	2 to 4
BIOL 3685	Externship Studies	3
BIOL 4291	Extrdepartmental Research	1 to 4
BIOL 4391	Accelerated Research in Biology	1-4
BIOL 4591	Research in Neuroscience	1 to 4

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 Biochemistry

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		
BIOL 1111 or BIOL 1911	Introduction to Organismal Biology or Honors Introduction to Organismal Biology	4
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
Credit Hours		15
Year 2		
Fall		
Select one of the following:		4
BIOL 1112 or BIOL 1912	Introduction to Biomolecules, Cells and Genomes or Honors Introduction to Biomolecules, Cells and Genomes	
BIOL 2112 or BIOL 2912	Introduction to Cellular and Molecular Biology or Honors Introduction to Cellular and Molecular Biology	
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)	
IH 0852 or IH 0952	Intellectual Heritage II: The Common Good or Honors Intellectual Heritage II: The Common Good	3
Credit Hours		15
Spring		
BIOL 2207	Genetics (S)	3
BIOL 2297	Research Techniques in Genetics (S)	3
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)	
Elective		2
Credit Hours		16
Year 3		
Fall		
BIOL 3204	Cell Structure and Function (F)	4
CHEM 3103	Techniques of Chemical Measurement I ¹	3
CHEM 3105	Introduction to Chemical Research Techniques ¹	1
Biochemistry Elective ²		3-4
GenEd Breadth Course		4-3
Credit Hours		15
Spring		
CHEM 3405	Physical Chemistry of Biomolecules ²	3
CHEM 4401	Biochemistry I	3
GenEd Breadth Course		3-4

GenEd Breadth Course		3
Elective		3-2
Credit Hours		15
Year 4		
Fall		
BIOL 4376	General Biochemistry II (F)	3
Biochemistry Elective ²		3-4
Biochemistry Elective ²		3-5
GenEd Breadth Course		3
Elective		4-1
Credit Hours		16
Spring		
CHEM 4496	Research Techniques in Biochemistry	4
BIOL 3324	Molecular Biology	3
GenEd Breadth Course		3
Elective		6
Credit Hours		16
Total Credit Hours		123

1

It is strongly encouraged that CHEM 3103/CHEM 3105 be taken prior to any laboratory courses numbered above CHEM 3105.

2

Biochemistry majors who want to take CHEM 4196 as a Biochemistry elective **must** take the CHEM 3301-CHEM 3302 sequence as CHEM 3405 does not serve as a prerequisite for these courses or any other course that has CHEM 3301 as a prerequisite or co-requisite.

Code	Title	Credit Hours
(F) - Fall only course		
(S) - Spring only course		

Biochemistry Electives

Code	Title	Credit Hours
Select three of the following:		9-13
BIOL 3113	Genome Analytics	
BIOL 3128	Genomics and Infectious Disease Dynamics (F)	
BIOL 3201	Human Genetics (F)	
BIOL 3212	Introduction to Bioinformatics and Computational Biology	
BIOL 3225	Evolutionary Genetics (S)	
BIOL 3232	Behavioral Genetics (F)	
BIOL 3243	Parasitology (Not offered every year)	
BIOL 3265	Developmental Biology (F)	
BIOL 3301	Advanced Cell Biology (S)	
BIOL 3317	General Microbiology (S)	
BIOL 3322	Biology of Plants (F)	
BIOL 3325	Research Techniques in Molecular Biology (S)	
BIOL 3327	Immunology (S)	
BIOL 3328	Virology (F)	
BIOL 3329	Developmental Genetics (Not offered every year)	
BIOL 3333	Advanced Techniques in Microscopy (S)	
BIOL 3334	Mammalian Physiology (S)	
BIOL 3352	Systems Neuroscience	
BIOL 3356	Organization and Development of the Nervous System (S)	

BIOL 3358	Cellular and Molecular Neuroscience (S)
BIOL 3361	Molecular Neuropharmacology (Not offered every year)
BIOL 3367	Endocrinology (F)
BIOL 3368	Biology of Cancer (S)
BIOL 3371	Cell Proliferation (S)
BIOL 3373	Cell Signaling (S)
BIOL 3374	Physical Biochemistry (S)
BIOL 3379	Biotechnology (S)
BIOL 3380	Contemporary Biology
BIOL 3396	Scientific Writing for Biology: The Art of Communicating (S)
BIOL 3403	Genomic Biology
BIOL 4338	Epigenetics (Not offered every year)
BIOL 4341	Genome Editing
BIOL 4364	Biochemistry of Embryogenesis (F)
BIOL 4365	Evolutionary Developmental Biology: Evo-Devo (S)
BIOL 4366	Stem Cell Biology (F)
BIOL 4375	General Biochemistry I (F)
BIOL 4483	Accelerated Research in Biochemistry ¹
BIOL 4491	Research in Biochemistry ¹
CHEM 3001	Inorganic Chemistry
CHEM 3301	Physical Chemistry Lecture I
CHEM 3302	Physical Chemistry Lecture II
CHEM 3881	Cooperative Research ¹
CHEM 3891	Undergraduate Research ¹
CHEM 4000-4800	
CHEM 4881	Cooperative Research ¹
CHEM 4891	Undergraduate Research ¹
MATH 2043 or MATH 2943	Calculus III Honors Calculus III

1

A minimum of 6 credits of these research courses, in any combination, may be used to fulfill one of the Biochemistry Electives.