Biochemistry, BS (Boston)

Overview

Website (http://cos.northeastern.edu/biochemistry/)

Advising website (https://docs.google.com/document/d/1JgPCHpZvKA_iMN4j2guuEfp1BiaVdLfBvhk9kMEAy9k/edit/)

Biochemistry focuses on the chemical processes occurring in the wide variety of living systems and touches essentially all aspects of our own lives. Our Northeastern program engages you in two integrated paths to a career in biochemistry: rigorous course work that is designed to prepare you to interpret the ever-expanding knowledge base and hands-on learning that positions you to leverage cutting-edge technology to solve fundamental problems in the chemistry of life.

After required basic course work in biochemistry, biology, chemistry, physics, and mathematics, our majors select elective courses that reflect many areas of biochemistry including neuroscience, bioorganic chemistry, stem cell and regenerative biology, microbial biotechnology, and systems biology and engineering.

In our interdisciplinary program, students take advantage of faculty-mentored research guided by investigators from bioengineering, biology, chemical engineering, chemistry, pharmaceutical sciences, physics, psychology, and other academic units.

Northeastern's signature co-op program provides complementary opportunities in world-class biotechnology companies, hospitals, and research facilities as close as Boston and as far as your global interest takes you.

Our biochemistry program prepares students to enter the job market directly or go on to graduate, medical, veterinary, dental, law, or business school. Our graduates are qualified for a wide range of careers that span academics, industry, government, and medicine, working in laboratory or clinical research, regulation and quality control, production, marketing, or information systems.

Program Requirements

Complete all courses listed below unless otherwise indicated. Also complete any corequisite labs, recitations, clinicals, or tools courses where specified and complete any additional courses needed beyond specific college and major requirements to satisfy graduation credit requirements.

Universitywide Requirements

All undergraduate students are required to complete the Universitywide Requirements (https://catalog.northeastern.edu/undergraduate/university-academics/university-wide-requirements/).

NUpath Requirements

All undergraduate students are required to complete the NUpath Requirements (https://catalog.northeastern.edu/undergraduate/university-academics/nupath/).

Biochemistry Major Requirements

Code	Title	Hours
Introduction to College		
BIOC 1000	Biochemistry at Northeastern	1
or INSC 1000	Science at Northeastern	
Biology Foundations		
Foundations		
BIOL 1107 and BIOL 1108	Foundations of Biology and Lab for BIOL 1107	5
Inquiries		
BIOL 2299	Inquiries in Biological Sciences	4
Techniques		
BIOL 2309	Biology Project Lab	4
Genetics and Molecular Biology		
BIOL 2301 and BIOL 2302	Genetics and Molecular Biology and Lab for BIOL 2301	5
General Chemistry		
CHEM 1161 and CHEM 1162	General Chemistry for Science Majors and Lab for CHEM 1161	5
Organic Chemistry 1		

CHEM 2311 and CHEM 2312	Organic Chemistry 1 and Lab for CHEM 2311	5
Organic Chemistry 2		
CHEM 2313 and CHEM 2314	Organic Chemistry 2 and Lab for CHEM 2313	5
Physical Chemistry		
CHEM 3431 and CHEM 3432	Physical Chemistry and Lab for CHEM 3431	5
Biochemistry Courses		
BIOL 3611 and BIOL 3612	Biochemistry and Lab for BIOL 3611	5
BIOL 4707	Cell and Molecular Biology	4
Complete one of the following:		3-5
CHEM 3331 and CHEM 3332	Bioanalytical Chemistry and Lab for CHEM 3331	
CHEM 5620	Protein Chemistry	
Experiential Learning Introduction		
EESC 2000	Professional Development for Co-op	1
Capstone		
Please complete one of the following options to fulfill the capstone requirement:		4-5
One-semester research options:		
BIOC 4991 and BIOC 4900	Research and Biochemistry Capstone	
BIOC 4994 and BIOC 4900	Internship and Biochemistry Capstone	
CHEM 4750	Senior Research	
Two-semester research option (Honors in the Discipline). Second semester will be:		
BIOC 4971	Junior/Senior Honors Project 2	
Non-research option:		
BIOL 4701	Biology Capstone	

Biology and Chemistry Advanced Electives

Code	Title	Hours
Complete 3 courses for a total of at least 10 semester hours. One must be a lecture-based BIOL course and one must be a lecture-based CHEM course. The third may be BIOL, CHEM, or Research:		10
Biology		
BIOL 2311 to BIOL 5999		
Chemistry		
CHEM 2310 to CHEM 5999		
Research Option		
Up to 4 semester hours may be biochemistry-related research for credit:		
BIOC 4970	Junior/Senior Honors Project 1	
BIOC 4991	Research	
BIOC 4994	Internship	

Biochemistry Breadth Courses

Code	Title	Hours
Mathematics Courses		
MATH 1341	Calculus 1 for Science and Engineering	4
MATH 1342	Calculus 2 for Science and Engineering	4
Physics Courses		
Physics 1		
Complete a lecture and lab set for Physics 1:		5
PHYS 1145 and PHYS 1146	Physics for Life Sciences 1 and Lab for PHYS 1145	

PHYS 1151 and PHYS 1152 and PHYS 1153	Physics for Engineering 1 and Lab for PHYS 1151 and Interactive Learning Seminar for PHYS 1151	
PHYS 1161 and PHYS 1162	Physics 1 and Lab for PHYS 1161	
PHYS 1171 and PHYS 1172 and PHYS 1173	Physics 1 for Bioscience and Bioengineering and Lab for PHYS 1171 and Interactive Learning Seminar for PHYS 1171	
Physics 2		
Complete a lecture and lab set for Physics 2:		5
PHYS 1147 and PHYS 1148	Physics for Life Sciences 2 and Lab for PHYS 1147	
PHYS 1155 and PHYS 1156 and PHYS 1157	Physics for Engineering 2 and Lab for PHYS 1155 and Interactive Learning Seminar for PHYS 1155	
PHYS 1165 and PHYS 1166	Physics 2 and Lab for PHYS 1165	
PHYS 1175 and PHYS 1176 and PHYS 1177	Physics 2 for Bioscience and Bioengineering and Lab for PHYS 1175 and Interactive Learning Seminar for PHYS 1175	
Statistics		
Complete one course from the following list. Students who receive transfer credit for the Advanced Placement Statistics exam may complete the 1 semester hour PSYC 2315 course (requires Psychology Department permission):		4-5
BIOE 2365 and BIOE 2366	Bioengineering Measurement, Experimentation, and Statistics and Lab for BIOE 2365	
ENVR 2500 and ENVR 2501 and ENVR 2502	Biostatistics and Lab for ENVR 2500 and Recitation for ENVR 2500	
MATH 3081	Probability and Statistics	
PHTH 2210	Foundations of Biostatistics	
PSYC 2320	Statistics in Psychological Research	

Writing Requirements

Code	Title	Hours
ENGW 1111	First-Year Writing	4
or ENGW 1102	First-Year Writing for Multilingual Writers	
ENGW 3307	Advanced Writing in the Sciences	4
or ENGW 3315	Interdisciplinary Advanced Writing in the Disciplines	

NUpath Requirements Met by Major

- Analyzing and Using Data (AD)
- Conducting Formal and Quantitative Reasoning (FQ)
- Demonstrating Thought and Action in a Capstone
- Engaging with the Natural and Designed World (ND)
- Integrating Knowledge and Skills Through Experience
- Writing Across Audiences and Genres

Biochemistry Major Credit/GPA Requirements

Complete 86 semester hours in the major. A minimum 2.000 GPA in the following course codes is required: BIOL, CHEM, MATH, PHYS.

Due to overlap in course content, double majoring in biochemistry and biology, biochemistry and cell and molecular biology, biochemistry and behavioral neuroscience, or biochemistry and chemistry is not permitted.

Program Requirement

136 total semester hours required

Plan of Study

Sample Plans of Study

Please note that these are sample plans of study. While the requirements are the same for all students, individual schedules may vary.

FOUR YEARS, TWO CO-OPS IN SUMMER SECOND HALF/FALL

Year 1

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
BIOC 1000 or INSC 1000	1	BIOL 2299	4	BIOL 2301	4	Elective 3	4
BIOL 1107	4	CHEM 2311	4	BIOL 2302	1	Elective 4	4
BIOL 1108	1	CHEM 2312	1	Elective 2	4		
CHEM 1161	4	ENGW 1111 or 1102	4				
CHEM 1162	1	MATH 1342	4				
CHEM 1163	0						
MATH 1341	4						
Elective 1	4						
	19		**17**		**9**		**8**

Year 2

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
BIOL 2309	4	BIOL 3611	4	BIOL 4707	4	Co-op	0
CHEM 2313	4	BIOL 3612	1	Elective 8	4		
CHEM 2314	1	EESC 2000	1				
PHYS 1151	3	PHYS 1155	3				
PHYS 1152	1	PHYS 1156	1				
PHYS 1153	1	PHYS 1157	1				
Elective 5	4	Elective 6	4				
		Elective 7	4				
	18		**19**		**8**		**0**

Year 3

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
Co-op	0	CHEM 3431	4	ENGW 3307 or 3315	4	Co-op	0
		CHEM 3432	1	Elective 10	4		
		CHEM 5620 or 3331 ***and*** 3332	3-5				
		ENVR 2500 and ENVR 2501 and ENVR 2502 (or other statistics course)	5				
		Elective 9	4				
	0		**17-19**		**8**		**0**

Year 4

Fall	Hours	Spring	Hours
Co-op	0	CHEM 4750 (or BIOL 4701 or BIOC 4971 or xxxx4991+BIOC 4900)	4
		BIOL or CHEM advanced elective	5
		BIOL or CHEM advanced elective	5
		BIOL or CHEM advanced elective	5
	0		**19**

Total Hours: 142-144

FOUR YEARS, TWO CO-OPS IN SPRING/SUMMER FIRST HALF

Year 1

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
BIOC 1000 or INSC 1000	1	BIOL 2299	4	BIOL 2301	4	Elective 3	4
BIOL 1107	4	CHEM 2311	4	BIOL 2302	1	Elective 4	4
BIOL 1108	1	CHEM 2312	1	Elective 2	4		
CHEM 1161	4	ENGW 1111 or 1102	4				
CHEM 1162	1	MATH 1342	4				
CHEM 1163	0						
MATH 1341	4						
Elective 1	4						
	19		**17**		**9**		**8**

Year 2

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
BIOL 2309	4	Co-op	0	Co-op	0	BIOL 3611	4
CHEM 2313	4					BIOL 3612	1
CHEM 2314	1					Elective 6	4
EESC 2000	1						
PHYS 1151	3						
PHYS 1152	1						
PHYS 1153	1						
Elective 5	4						
	19		**0**		**0**		**9**

Year 3

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
ENGW 3307 or 3315	4	Co-op	0	Co-op	0	BIOL 4707	4
PHYS 1155	3					Elective 8	4
PHYS 1156	1						
PHYS 1157	1						
ENVR 2500 and ENVR 2501 and ENVR 2502 (or other statistics course)	5						
Elective 7	4						
	18		**0**		**0**		**8**

Year 4

Fall	Hours	Spring	Hours
CHEM 3431	4	CHEM 4750 (or BIOL 4701 or BIOC 4971 or xxxx4991+BIOC 4900)	4
CHEM 3432	1	BIOL or CHEM advanced elective	5
CHEM 5620 or 3331 ***and*** 3332	3-5	BIOL or CHEM advanced elective	5
BIOL or CHEM advanced elective	5	Elective 10	4
Elective 9	4		
	17-19		**18**

Total Hours: 142-144

FIVE YEARS, THREE CO-OPS IN SUMMER SECOND HALF/FALL

Year 1

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
BIOC 1000 or INSC 1000	1	BIOL 2299	4	BIOL 2301	4	Vacation	
BIOL 1107	4	CHEM 2311	4	BIOL 2302	1		
BIOL 1108	1	CHEM 2312	1	Elective 2	4		
CHEM 1161	4	ENGW 1111 or 1102	4				
CHEM 1162	1	MATH 1342	4				
CHEM 1163	0						
MATH 1341	4						
Elective 1	4						
	19		**17**		**9**		**0**

Year 2

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
BIOL 2309	4	BIOL 3611	4	BIOL or CHEM advanced elective	4	Co-op	0
CHEM 2313	4	BIOL 3612	1	Elective 6	4		
CHEM 2314	1	EESC 2000	1				
PHYS 1151	3	PHYS 1155	3				
PHYS 1152	1	PHYS 1156	1				
PHYS 1153	1	PHYS 1157	1				
Elective 3	4	Elective 4	4				
		Elective 5	4				
	18		**19**		**8**		**0**

Year 3

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
Co-op	0	CHEM 3431	4	Vacation		Co-op	0
		CHEM 3432	1				
		ENVR 2500 and ENVR 2501 and ENVR 2502	5				
		ENGW 3307 or 3315	4				
		Elective 7	4				
	0		**18**		**0**		**0**

Year 4

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
Co-op	0	CHEM 5620 or 3331 ***and*** 3332	3-5	Vacation		Co-op	0
		BIOL or CHEM advanced elective	5				
		Elective 8	4				
		Elective 9	4				
	0		**16-18**		**0**		**0**

Year 5

Fall	Hours	Spring	Hours
Co-op	0	BIOL 4707	4
		CHEM 4750 (or BIOL 4701 or BIOC 4971 or xxxx4991+BIOC 4900)	4
		BIOL or CHEM advanced elective	5

		Elective 10	4				
	0		**17**				

Total Hours: 141-143

FIVE YEARS, THREE CO-OPS IN SPRING/SUMMER FIRST HALF

Year 1

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
BIOC 1000	1	BIOL 2299	4	BIOL 2301	4	Vacation	
BIOL 1107	4	CHEM 2311	4	BIOL 2302	1		
BIOL 1108	1	CHEM 2312	1	Elective 2	4		
CHEM 1161	4	ENGW 1111 or 1102	4				
CHEM 1162	1	MATH 1342	4				
CHEM 1163	0						
MATH 1341	4						
Elective 1	4						
	19		**17**		**9**		**0**

Year 2

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
BIOL 2309	4	Co-op	0	Co-op	0	BIOL 3611	4
CHEM 2313	4					BIOL 3612	1
CHEM 2314	1					Elective 4	4
EESC 2000	1						
PHYS 1151	3						
PHYS 1152	1						
PHYS 1153	1						
Elective 3	4						
	19		**0**		**0**		**9**

Year 3

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
ENVR 2500 and ENVR 2501 and ENVR 2502 (or other statistics course)	5	Co-op	0	Co-op	0	Vacation	
PHYS 1155	3						
PHYS 1156	1						
ENGW 3307 or 3315	4						
PHYS 1157	1						
Elective 5	4						
	18		**0**		**0**		**0**

Year 4

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
BIOL 4707	4	Co-op	0	Co-op	0	Vacation	
CHEM 3431	4						
CHEM 3432	1						
CHEM 5620 or 3331 ***and*** 3332	3-5						
Elective 6	4						
	16-18		**0**		**0**		**0**

Year 5

Fall	Hours	Spring	Hours
BIOL or CHEM advanced elective	5	CHEM 4750 (or BIOL 4701 or BIOC 4971 or xxxx4991+BIOC 4900)	4

BIOL or CHEM advanced elective	5	BIOL or CHEM advanced elective	5
Elective 7	4	Elective 9	4
Elective 8	4	Elective 10	4
	18		**17**

Total Hours: 142-144