

BIOCHEMISTRY, B.S.

Contact

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Mission

Chemistry and physics are fundamental sciences that touch every aspect of our lives and the world around us. Chemistry is the study of matter – its chemical and physical properties, the chemical and physical changes it undergoes, and the energy changes that accompany those processes. Chemistry often is referred to as the central science, it rests upon the foundation of mathematics and physics and in turn, is the essential basis for the life sciences such as biology and medicine. Chemistry is largely an experimental science and has applications in such diverse areas of research as the development of new drugs, the search for solutions to problems of environmental pollution, and the derivation of alternative energy sources. Much cutting-edge research in biology and medicine is being carried out at the level of atoms and molecules, the particles of matter upon which the study of chemistry is based.

Physics, too, is the study of matter and energy, viewed from a different perspective. Understanding living systems and the universe in which we live requires an understanding of the chemical and physical principles that operate within them.

In addition to offering majors in Chemistry, Biochemistry, and Laboratory Science, and minors in Chemistry Biochemistry, and Biophysics, the School of Molecular and Physical Sciences fills a significant role for students in other programs through its introductory courses in chemistry and physics. Because of the fundamental roles of chemistry and physics in the biological, environmental, and health sciences, students in these programs benefit from the conceptual, quantitative, problem-solving, and communication skills stressed in the introductory courses, which form the foundation for later courses in the students' majors.

Major Description

The Bachelor of Science degree with a major in Biochemistry, with its balanced curriculum, assures that each student will gain a solid biochemical foundation, while securing a substantial foundation in the other major chemical subdisciplines, including analytical chemistry, organic chemistry, inorganic chemistry, and physical chemistry.

This major is an excellent choice for students who are especially interested in studying the infrastructure and applications of chemistry in biological systems. With appropriate choice of courses, graduates will be prepared for entry into graduate programs in chemistry, biochemistry, or the biomedical sciences, and well-prepared for professional programs in medicine, dentistry, veterinary medicine, pharmacy, and many other fields that rely on chemistry as a fundamental science.

Students wishing to enter the job market immediately after completion of their degree program have available to them a wide range of career opportunities in both the public and private sectors. Graduates will be especially well-prepared for entry-level positions in the rapidly growing biotechnology industry.

Honors Program

We offer qualified students the option of graduating with Honors. This includes significant research, scholarship or creative activity under the direction of a faculty member. Interested students should consult with their advisor.

Transfer Credit

See Undergraduate Admissions (<https://catalog.une.edu/undergraduate/admissions/>) for more information.

Admissions

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Financial Information

Tuition and fees for subsequent years may vary. Other expenses include books and housing. For more tuition and fee information, please consult this catalog's Financial Information (<https://catalog.une.edu/undergraduate/financial-information-undergraduate-programs/>) section.

Curricular Requirements

Code	Title	Hours
Nor'easter Core Requirements		
Nor'easter Core Requirements (https://catalog.une.edu/undergraduate/core-curriculum/)		40
Program Required Courses		
BIO 105 & 105L	Biology I: Ecology/Evolution and Bio I: Ecology/Evolution Lab	4
BIO 106 & 106L	Biology II: Cellular/Molecular and Bio II: Cellular/Molecular Lab	4
BIO 214 & 214L	Genetics and Genetics Lab	4
BIO 370	Cell & Molecular Biology	3
CHE 150 & 150L	University General Chemistry I and University General Chemistry I Lab ¹	4
CHE 151 & 151L	University General Chemistry II and University General Chemistry II Lab ¹	4
CHE 250 & 250L & 250S	University Organic Chemistry I and University Organic Chemistry I Lab and University Organic Chemistry I Lab Lecture ²	5
CHE 251 & 251L & 251S	University Organic Chemistry II and University Organic Chemistry II Lab and University Organic Chemistry II Lab Lecture ¹	5
CHE 307 & 307L	Quantitative Analysis and Quantitative Analysis Lab	5
CHE 327 or CHE 371	Applied Physical Chemistry	3
CHE 350 & 350L	Biochemistry I: Proteins and Biochemistry I Proteins Lab	5
CHE 351	Biochemistry II: Metabolism/Bioenergetics	3
Select one of the following:		2-4
CHE 375	Advanced Laboratory	
CHE 417 & 417L	Instrumental Methods of Analysis and Instrumental Methods Lab	
CHE 450	Advanced Biochemistry Lab	

CHE 401	Seminar	1
MAT 190	Calculus I	4
MAT 195	Calculus II	4
PHY 210	University Physics I ²	4
PHY 211	University Physics II ²	4
Six Credits of Program Specific Electives		6
Open Elective Courses (Students complete open elective credits as necessary to meet the University's 120-credit minimum for graduation. The total number of elective credits required will depend on the student's completed program, core, and other degree requirements.)		6
Total Hours		120-122

¹ If not already taken for the program-required course option.

² Matriculated majors are expected to enroll in the University course sequences for general chemistry, organic chemistry, and physics. The following substitutions may be made with program permission: CHE 110 General Chemistry I for CHE 150 University General Chemistry I; CHE 111 General Chemistry II for CHE 151 University General Chemistry II; CHE 201 Organic Chemistry I for CHE 250 University Organic Chemistry I; CHE 202 Organic Chemistry II for CHE 251 University Organic Chemistry II; PHY 110 General Physics I w/Lab for PHY 210 University Physics I; and/or PHY 111 General Physics II w/Lab for PHY 211 University Physics II.

Program Specific Electives

Code	Title	Hours
CHE 280	Intermediate Inorganic Chemistry	3
CHE 320	(Mechanistic Organic Chemistry)	
CHE 370 & 370L	Physical Chemistry I and Physical Chemistry I Lab	4
CHE 375	Advanced Laboratory ¹	2
CHE 380	Inorganic Chemistry (Inorganic Chemistry)	3
CHE 405	Medicinal Chemistry	3
CHE 410	Research I ³	1-3
CHE 411	Research II ³	1-3
CHE 417 & 417L	Instrumental Methods of Analysis and Instrumental Methods Lab ¹	4
CHE 420	(Spectroscopic Methods of Structural Analysis)	3
CHE 450	Advanced Biochemistry Lab ²	3
CHE 495	Advanced Chemistry Internship ³	3

Please note: While some courses can fulfill both core and program requirements, the credits earned do not count twice towards the minimum total required credits for the degree.

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³ Not to exceed three credits total combined between CHE 410 Research I, CHE 411 Research II, and CHE 495 Advanced Chemistry Internship.

Students in this major can participate in the pre-health graduate school preparation tracks. (<https://catalog.une.edu/programs/science-prerequisites-health-professions/>)

Academic and Technical Standards

A minimum grade of C- must be achieved in all required science and mathematics courses used toward graduation in biochemistry, and a 2.00 cumulative grade-point average in the sciences is a requirement for graduation.

Learning Outcomes

Upon completion of the Biochemistry major, students will be able to:

- Describe and apply advanced biochemical information and concepts
- Demonstrate proficiency in safe and ethical laboratory practices and use of instrumentation standard to the discipline
- Clearly communicate biochemical information in both oral and written forms
- Work collaboratively in various team settings
- Compete for placement in graduate programs or employment relevant to the field of study