

BIOCHEMISTRY and MOLECULAR BIOLOGY

Biochemistry is concerned with the chemistry of the materials fundamental to life and contributes toward the understanding of the structure and functioning of all organisms. Because of the rapid advances in the areas of biotechnology, molecular biology and genetic engineering, biochemistry is an exciting area for study and research.

Background Information

The undergraduate program in biochemistry at North Dakota State University is planned for students who are seeking careers in the life sciences, agriculture, medicine or health-related fields. The program is also suited for students who are contemplating advanced graduate degrees in biochemistry, botany, zoology and microbiology, or professional degrees in dentistry and medicine.

The biochemistry program is offered by the Department of Chemistry and Biochemistry.

The Program

Students with an interest in biochemistry earn a Bachelor of Science degree in biochemistry and molecular biology. This provides flexibility in the selection of courses for those students who plan to seek employment in areas related to biochemistry, enter graduate or medical school, or teach in high schools or higher education institutions. The program provides training in biochemistry, botany, microbiology, zoology or in applied areas according to the student's interest. In addition to the courses in chemistry, physics and mathematics, an additional 16 credits in biological sciences, 18 credits of electives in the humanities and social sciences, nine credits in English, three credits in speech and two credits in wellness are required. The pre-medical student is encouraged to take a year of upper-level zoology.

All undergraduates in biochemistry and molecular biology receive assistance in planning and scheduling classes from faculty advisors. In addition to course work and laboratory courses, students also have the opportunity to learn by conducting research in various areas of biochemistry under faculty guidance.

Faculty and Facilities

The Department of Chemistry and Biochemistry is well staffed with 17 faculty members. All of the faculty have doctorate degrees from well-known universities. Most of them have considerable experience in postdoctoral or industrial research.

The research and teaching facilities for the department are housed in four buildings – A. Glenn Hill Center, Ladd Hall, Dunbar Laboratories, and the Quentin Burdick Building.

Advanced instruments and facilities are readily available. These include ultracentrifuges; gene synthesizer; nuclear magnetic, infrared, ultraviolet and mass spectrometers; gas and liquid chromatographs; computers; recombinant DNA and cell and tissue culture laboratories; and an advanced electron microscope facility.

Career Opportunities

Employment opportunities for biochemists are found at higher education institutions within the chemistry, biochemistry and biological sciences departments; in medical schools, hospitals, research institutes and government research laboratories; and in other health, energy, environment and agricultural research programs. Biochemists are employed at all levels in industries concerned with food processing, manufacturing, genetic engineering and marketing of drugs, cosmetics and pesticides, as well as in the petroleum and allied industrial complexes.

Earnings of persons trained in biochemistry vary and the salary level depends largely upon the amount of formal training a person has received. Entry-level salaries for biochemists average \$44,100 per year, based on 2016 data from www.payscale.com. For biochemists who have an advanced degree, salaries and opportunities are much greater.

High School Preparation

A strong high school background in English, mathematics (through trigonometry, if possible), biology, chemistry and physics is recommended.

Biochemistry and Molecular Biology Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

Freshman			
Fall	Credits	Spring	Credits
BIOL 150 General Biology I and 150L General Biology I Laboratory	4	MATH 166 Calculus II	4
CHEM 150 Principles of Chemistry I or 121 General Chemistry I	3	CHEM 151 Principles of Chemistry II or 122 General Chemistry II	3
CHEM 160 Principles of Chemistry Laboratory I or 121L General Chemistry I Laboratory	1	CHEM 161 or Principles of Chemistry Laboratory II or 122L General Chemistry II Laboratory	1
ENGL 110 College Composition I	4	ENGL 120 College Composition II	3
MATH 165 Calculus I	4	Gen Ed Humanities & Fine Arts	3
	16	Gen Ed Social & Behavioral Sciences	3
			17
Sophomore			
Fall	Credits	Spring	Credits
COMM 110 Fundamentals of Public Speaking	3	PHYS 252 University Physics II	4
CHEM 341 Organic Chemistry I	3	PHYS 252L University Physics II Laboratory	1
CHEM 353 Majors Organic Chemistry Laboratory I	1	CHEM 342 Organic Chemistry II	3
BIOL 315 Genetics	3	CHEM 354 Majors Organic Chemistry Laboratory II	2
PHYS 251 University Physics I and 251L University Physics I Laboratory	5	Gen Ed Humanities & Fine Arts/Gen Ed Global Perspectives	3
	15	Gen Ed Social & Behavioral Sciences/Gen Ed Cultural Diversity	3
			16
Junior			
Fall	Credits	Spring	Credits
BIOC 460 Foundations of Biochemistry and Molecular Biology I	3	CHEM 380 Chemistry Junior Seminar	1
BIOC 460L Foundations of Biochemistry I Laboratory	1	BIOC 461 Foundations of Biochemistry and Molecular Biology II	3
CHEM 431 Analytical Chemistry	3	BIOC 474 Methods of Recombinant DNA Technology	3
MICR 350 General Microbiology	3	STAT 330 Introductory Statistics	3
MICR 350L General Microbiology Lab	2	300-400 Level Science Elective ¹	3
ENGL 321 Writing in the Technical Professions or 324 Writing in the Sciences	3	300-400 Level Science Elective ¹	3
	15		16
Senior			
Fall	Credits	Spring	Credits
BIOC 473 Methods of Biochemical Research	3	BIOC 487 Molecular Biology of Gene Expression	3
BIOC 483 Cellular Signal Transduction Processes and Metabolic Regulations	3	CHEM 491 Seminar	2
CHEM 465 Survey of Physical Chemistry	4	300-400 Level Science Electives ¹	3
Humanities or Social Science College Requirement ²	3	Humanities or Social Science College Requirement ²	3
	13	Gen Ed Wellness	2
			13
Total Credits: 121			

¹ Courses in BIOL, BOT, ZOO, CHEM, CSCI, MICR, PSCI, PHYS, PPTH, or STAT. No more than 6 credits from one prefix may apply. Research credits (CHEM 494/BIOC 494) may count towards 3 of these credits.

² Humanities and Social Sciences may be fulfilled by any course having the following prefix: ADHM, ANTH, ARCH, ART, CJ, CLAS, COMM, ECON, ENGL, FREN, GEOG, GERM, HDFS, LA, LANG, MUSC, PHIL, POLS, PSYC, RELS, SOC, SPAN, THEA, WGS, or any course from the approved list of general education in the humanities & fine arts and the social & behavioral sciences categories (A & B). These credits must come from outside the department of the student's major.

View NDSU equivalencies of transfer courses at: www.ndsu.edu/transfer/equivalencies

For Further Information

MAILING ADDRESS: Chemistry and Biochemistry | NDSU Dept 2735 | PO Box 6050 | Fargo, ND 58108-6050
DEPT EMAIL: ndsu.chemistry@ndsu.edu
DEPT LOCATION: Ladd Hall
DEPT PHONE: (701) 231-8694
DEPT WEBSITE: www.ndsu.edu/chemistry/