Duluth Campus

Biochemistry B.S.

Chemistry and Biochemistry

Swenson College of Science and Engineering

- Program Type: Baccalaureate
- Requirements for this program are current for Fall 2022
- Required credits to graduate with this degree: 120
- Required credits within the major: 86 to 91
- Degree: Bachelor of Science

Biochemistry is the study of life at the molecular level. This field is both a life science and a chemical science, exploring the chemistry of living organisms and the molecular basis for the processes that occur in living cells. The Department of Chemistry and Biochemistry provides classroom and laboratory learning opportunities and research experiences across the discipline to meet the needs of students in engineering, liberal arts, and pre-professional programs, as well as those of students who wish to pursue careers or graduate studies in chemistry or related disciplines.

Honors requirements: The Department of Chemistry and Biochemistry honors program helps outstanding biochemistry and molecular biology majors become competent, independent research workers, encourages student interest in the discipline, and aids in the transition from student to working scientist. Qualified majors may apply after the first semester of their sophomore year. Participants choose a research adviser and complete two semesters on a jointly developed project. Written reports and an oral presentation of the research are also required.

Program Delivery

This program is available:

- via classroom (the majority of instruction is face-to-face)

Admission Requirements

For information about University of Minnesota admission requirements, visit the Office of Admissions website.

General Requirements

The Board of Regents, on recommendation of the faculty, grants degrees from the University of Minnesota. Requirements for an undergraduate degree from University of Minnesota Duluth include the following:

1. Students must meet all course and credit requirements of the departments and colleges or schools in which they are enrolled including an advanced writing course. Students seeking two degrees must fulfill the requirements of both degrees. However, two degrees cannot be awarded for the same major.
2. Students must complete all requirements of the Liberal Education Program.
3. Students must complete a minimum of 120 semester credits.
4. At least 30 of the last 60 degree credits earned immediately before graduation must be awarded by UMD.
5. Students must complete at least half of their courses at the 3xxx-level and higher at UMD. Study-abroad credits earned through courses taught by UM faculty and at institutions with which UMD has international exchange programs may be used to fulfill this requirement.
6. If a minor is required, students must take at least three upper division credits in their minor field from UMD.
7. The minimum cumulative UM GPA required for graduation will be 2.00 and will include only University of Minnesota coursework. A minimum UM GPA of 2.00 is required in each UMD undergraduate major and minor. No academic unit may impose higher grade point standards to graduate.
8. Diploma, transcripts, and certification will be withheld until all financial obligations to the University have been met.

Program Requirements

1. A minor or second major in a different subject is required.
   a. A minor in chemistry or Biochemistry BA cannot be declared with the Biochemistry BS.
   b. The Chemistry BA may be declared as an additional degree with the Biochemistry BS. However, this combination does not satisfy the requirement for a minor or a second major in a different subject.
   c. The Biochemistry BS and Chemistry BS may be declared. This combination satisfies the

requirement of a minor or second major in a different subject.

2. Students earning a BS degree who wish to have their degree certified by the American Chemical Society must complete at least 130 hours of additional laboratory work through participation in undergraduate research with a comprehensive written report and/or through additional chemistry laboratory courses.

Year One (30 cr)

CHEM 1173/74 and 1175/76 are the preferred courses. High school algebra and high school chemistry is required for CHEM 1173, 1174. This schedule presupposes placement into MATH 1296.

BIOL 1011 - General Biology I [LE CAT, NAT SCI] (5.0 cr)
BIOL 1012 - General Biology II [SUSTAIN] (5.0 cr)

Chemistry I

CHEM 1173 - General Chemistry I for Majors [NAT SCI] (4.0 cr)
or CHEM 1153 - General Chemistry I [LE CAT, NAT SCI] (4.0 cr)
CHEM 1174 - General Chemistry I Lab for Majors [NAT SCI] (1.0 cr)
or CHEM 1154 - General Chemistry Lab I [LE CAT, NAT SCI] (1.0 cr)

Chemistry II

CHEM 1175 - General Chemistry II for Majors (4.0 cr)
or CHEM 1155 - General Chemistry II (4.0 cr)
CHEM 1176 - General Chemistry II Lab for Majors (1.0 cr)
or CHEM 1156 - General Chemistry Lab II (1.0 cr)

Mathematics

MATH 1296 - Calculus I [LE CAT, LOGIC & QR] (5.0 cr)
MATH 1297 - Calculus II [LOGIC & QR] (5.0 cr)

Year Two (25-26 cr)

BIOL 2201 - Genetics (3.0 cr)
CHEM 2541 - Organic Chemistry I (3.0 cr)
CHEM 2542 - Organic Chemistry II (3.0 cr)
CHEM 2543 - Organic Chemistry I Laboratory (1.0 cr)
CHEM 2544 - Organic Chemistry II Laboratory (1.0 cr)
or CHEM 2545 - Organic Chemistry II Laboratory for B.S. Chemistry Majors (2.0 cr)

Analytical Chemistry

CHEM 2222 - Quantitative Analysis (3.0 cr)
CHEM 2223 - Quantitative Analysis Laboratory (1.0 cr)

Physics

PHYS 2013 - General Physics I [LE CAT, NAT SCI] (4.0 cr)
or PHYS 2017 - Honors: General Physics I [NAT SCI] (4.0 cr)
PHYS 2014 - General Physics Lab I [NAT SCI] (1.0 cr)
PHYS 2015 - General Physics II (4.0 cr)
or PHYS 2018 - Honors General Physics II (4.0 cr)
PHYS 2016 - General Physics Lab II (1.0 cr)

Year Three (21 - 25 cr)

BIOL 3100 - Cell Biology (3.0 cr)
BIOL 4231 - Molecular Biology (3.0 cr)
BIOL 4232 - Molecular Biology Laboratory (2.0 cr)
CHEM 4184 - Undergraduate Seminar I (1.0 cr)
CHEM 4351 - Biochemistry I (3.0 cr)
CHEM 4352 - Biochemistry II (3.0 cr)
CHEM 4363 - Biochemistry Laboratory (2.0 cr)

Physical Chemistry

It is recommended students take CHEM 4634 and 4633
CHEM 4634 *{Inactive}*(3.0 cr)
CHEM 4633 *{Inactive}*(1.0 cr)
or CHEM 4641 - Thermodynamics and Kinetics (3.0 cr)
CHEM 4643 - Thermodynamics and Kinetics Lab (1.0 cr)
CHEM 4642 - Quantum Mechanics and Spectroscopy (3.0 cr)
CHEM 4644 - Quantum Mechanics and Spectroscopy Laboratory (1.0 cr)

Year Four (4 cr)

CHEM 3432 - Descriptive Inorganic Chemistry (3.0 cr)
CHEM 4185 - Undergraduate Seminar II (1.0 cr)

Required Elective (3 cr)

Take 3 or more credit(s) from the following:

•CHEM 4242 - Instrumental Analysis (3.0 cr)
•CHEM 4373 - Physical Biochemistry: Statistical Bio-Thermodynamics (3.0 cr)
•CHEM 4436 - Inorganic Chemistry (3.0 cr)

Advanced Writing (3 cr)
WRIT 31xx Advanced Writing