

BIOCHEMISTRY/MOLECULAR BIOLOGY, BACHELOR OF SCIENCE

College: College of Science and Health
Department: Biological Sciences and Physical Sciences
Student Type: Traditional Undergraduate
Degree: Bachelor of Science
Campus: Lisle Campus

Requirements - Major

The Biochemistry/Molecular Biology major must complete with a grade of "C" or better the following courses:

| Code | Title | Hours |
|--------------------------------------|--|-------|
| BIOL 1195 | Principles of Organismal Lab | 1 |
| BIOL 1197 | Principles of Organismal Biology | 3 |
| BIOL 1198 | Principles of Biology | 3 |
| BIOL 1199 | Principles of Biology Lab | 1 |
| BIOL 2250 | Genetics | 3 |
| BIOL 2260 | Recombinant DNA Lab | 1 |
| BIOL 4393 | Great Ideas in Biology and Medicine | 1 |
| BIOL 5371 | Molecular Biology | 3 |
| BIOL 5372 | Genomics and Bioinformatics | 3 |
| CHEM 1113 | General Chemistry I | 3 |
| CHEM 1115 | Honors General Chemistry I Laboratory | 1 |
| CHEM 1123 | General Chemistry II | 3 |
| CHEM 1125 | Honors General Chemistry II Laboratory | 1 |
| CHEM 3231 | Instrumental Analysis | 3 |
| CHEM 3237 | Instrumental Analysis Lab | 1 |
| CHEM 2242 | Organic Chemistry I | 3 |
| CHEM 2244 | Honors Organic Chemistry I Laboratory | 1 |
| CHEM 2247 | Organic Chemistry II | 3 |
| CHEM 2249 | Honors Organic Chemistry II Laboratory | 1 |
| CHEM 3261 | Principles of Biochemistry | 3 |
| CHEM 4365 | Cellular Metabolism | 3 |
| Select one of the following options: | | 8-12 |
| Option A: | | |
| PHYS 1113 | College Physics I | |
| PHYS 1114 | College Physics I Laboratory | |
| PHYS 1118 | College Physics II | |
| PHYS 1119 | College Physics II Laboratory | |
| Option B: | | |
| PHYS 2205 | University Physics I Laboratory | |
| PHYS 2206 | University Physics II Laboratory | |
| PHYS 2207 | University Physics III Laboratory | |
| PHYS 2211 | University Physics I | |
| PHYS 2212 | University Physics II | |
| PHYS 2213 | University Physics III | |
| MATH 2210 | Calculus I | 4 |
| MATH 2229 | Biostatistics | 3 |
| 3000 or above Elective | | 3 |

| | |
|---------------------------------------|--------------|
| 4000 or higher Electives ² | 6 |
| Total Hours | 69-73 |

- ¹ Must be a chemistry, computer science, mathematics, biology, or physics course numbered 3000 or above (excluding all research, teaching and internship classes).
² May be either physics, chemistry, computer science, mathematics or biology courses at the 4000 level or higher (excluding all teaching and internship classes) or it may be at least 3 semester credit hours of research credit (in BIOL, CHEM, CMSC, MATH and/or PHYS).

A student who chooses the research option must present a research seminar and submit a research report to both their mentor and the director of the Biochemistry/Molecular Chemistry program. Students who plan to attend graduate school are strongly encouraged to carry out a research project. Biochemistry/Molecular Biology majors who carry out research in the summer months as a paid internship (either on or off campus) may request to have this experience replace 2 semester credit hours of research.

A student may have only one major in the Biochemistry/Molecular Biology, Biology, Chemistry, and Health Science programs.

Progression in the Biochemistry/Molecular Biology Program

All prospective Biochemistry/Molecular Biology majors must complete the following with a GPA of 3.200 or above and a grade of "C" or better:

| Code | Title | Hours |
|--------------------|--|-----------|
| BIOL 1195 | Principles of Organismal Lab | 1 |
| BIOL 1197 | Principles of Organismal Biology | 3 |
| BIOL 1198 | Principles of Biology | 3 |
| BIOL 1199 | Principles of Biology Lab | 1 |
| CHEM 1113 | General Chemistry I | 3 |
| CHEM 1115 | Honors General Chemistry I Laboratory | 1 |
| CHEM 1123 | General Chemistry II | 3 |
| CHEM 1125 | Honors General Chemistry II Laboratory | 1 |
| MATH 2210 | Calculus I | 4 |
| Total Hours | | 20 |

The entire introductory sequence must be completed prior to taking BIOL 2260 Recombinant DNA Lab. Transfer students will use a combination of equivalent classes (as determined by the University transfer articulation process and by the Biochemistry/Molecular Biology program) accepted from their home institutions plus any other Benedictine University classes needed. The original grades of any repeated classes will be included in the GPA calculation. Any other substitutions to the above list of courses will be made on a case-by-case basis and must be approved by the Biochemistry/Molecular Biology program. Students must meet the above requirements in order to progress in the Biochemistry/Molecular Biology major.

Other Information

Why study Biochemistry/Molecular Biology at Benedictine?

When you choose to major in Biochemistry/Molecular Biology at Benedictine University, you will have the opportunity to:

1. Pursue a degree in an interdisciplinary major that emphasizes critical-thinking and problem-solving skills;
2. Pursue an investigative-orientated approach to science;
3. Use advanced research instrumentation and techniques in modern laboratories;
4. Participate in a highly productive and nationally recognized undergraduate research program that has received external funding from federal agencies and the private sector;
5. Have the opportunity to use the extensive facilities in our Birck Hall of Science, and the possibility of facilities at such off-campus sites as BP Amoco, Argonne National Laboratory, or Nalco, among others;
6. Prepare students to study systems biology by exposing students to the disciplines and tools of bioinformatics, genomics, and proteomics;
7. Publish and present your research findings at local, regional, and national symposia;
8. Have the confidence of participating in a program that follows the guidelines of the American Society of Biochemistry and Molecular Biology.

What careers are available with a degree in Biochemistry/Molecular Biology?

Biochemistry and Molecular Biology embody the molecular basis to the chemistry of life while unifying and strongly contributing to many other scientific disciplines. Unlike the traditional Biology or Chemistry major, the Biochemistry/Molecular Biology program is focused on interdisciplinary education in the natural sciences. BMB students follow a rewarding integrated curriculum in Biology and Chemistry that focuses on understanding the molecular basis of life. Biochemistry and Molecular Biology are distinguished by their focus on information flow, structure, function and mechanism within overarching biological contexts. This intensive and research-oriented training prepares students for exciting graduate programs that are often unavailable to the traditional science major. These include graduate or health-career programs in biochemistry, cell and molecular biology, developmental biology, genetics, microbiology and biotechnology. Many of our past graduates have gained admission into competitive professional programs in health professions such as medicine, dentistry, or pharmacy. Biochemistry is also becoming increasingly valued in the premedical and health professional undergraduate science curriculum as the Medical College Admission Test (MCAT) now has a more profound focus on biochemistry. During the MCAT revision process, faculty at medical schools explicitly identified biochemistry as the most important discipline for later mastery of medical school curricula. The Biochemistry/Molecular Biology major also prepares students for rewarding entry-level research and development careers in biotechnology and industry. National and state-level career prospects are currently very bright for someone trained in the molecular life sciences. Given the ongoing and consistent growth in the biotechnology sector combined with the University's location in the heart of the research and development corridor of metropolitan Chicago, a local market exists for highly trained undergraduates with a Bachelor of Science in Biochemistry/Molecular Biology.

How does the program work?

Our Biochemistry/Molecular Biology program provides a high quality Catholic liberal arts education with interdisciplinary STEM training in order to shape molecular life scientists who are prepared for ethical decision making, being life-long learners and disciplined scholars, practicing responsible stewardship, being effective communicators, being engaged citizens, being thought leaders in molecular life sciences,

and co-operating effectively in small teams with people from various religions and cultures. Biochemistry/Molecular Biology students are closely mentored by supportive and dedicated faculty members of the Departments of Biological and Physical Sciences in research and teaching laboratories as well as classrooms and professional settings in order to ultimately help our program graduates build a rewarding life full of meaning and purpose.

As a Biochemistry/Molecular Biology major, you will acquire a broad base of knowledge, represented by the University's core courses required of all students, which are invaluable to your future career development and daily interactions as informed ethical citizens of your community. Within the Biochemistry/Molecular Biology major, you will obtain proficiency in calculus, physics, general biology, and general and organic chemistry. In the upper-level courses you will gain a fundamental understanding of such concepts as biological energy transduction, enzyme catalysis, macromolecular structure and function, qualitative and quantitative analysis of biological fluids, the chemical logic of metabolic pathways, the storage and transmission of genetic information, and the maintenance and regulation of the genome. In the accompanying labs, you will clone and manipulate nucleic acids as well as isolate and characterize proteins and enzymes. Finally, via the program's capstone experience, you will design and carry out a laboratory research project.

Objectives

Students who earn a Biochemistry/Molecular Biology major will achieve the following student learning outcomes (SLO):

Student Learning Outcome 1. Students will demonstrate knowledge of biochemistry and molecular biology required in professional settings
• University SLO: 1. Disciplinary Competence and Skills

Student Learning Outcome 2. Students will use scientific evidence to communicate biochemistry and molecular biology concepts
• University SLO: 3. Communication Skills

Student Learning Outcome 3. Students will use quantitative reasoning to solve biochemistry and molecular biology problems
• University SLO: 2. Critical and Creative Thinking Skills; 5. Analytical Skills

Student Learning Outcome 4. Students will discuss biochemistry and molecular biology relevance to societal issues
• University SLO: 7. Civic Engagement and Social Responsibility; 8. Stewardship