# Biochemistry

**Department of Natural Sciences**

**College of Arts, Sciences, and Letters**

## The Program

Biochemistry is the study of the molecular processes that enable all living organisms to feed, grow, move and reproduce. Biochemistry bridges the biological sciences and chemistry, and includes the study of proteins, DNA, lipids, hormones, and other biomolecules. Biochemists study the reactions by which molecules are synthesized and broken down, and how these processes are regulated. Discoveries and innovations in biochemistry have led to better drugs, improved health, better nutrition, and increased understanding of how genes define a unique species.

This degree program is designed to provide the student with an understanding of the structural and functional relationships between the chemical constituents of cells and their roles in life processes. The requirements include courses in biological sciences and chemistry, and appropriate courses in mathematics and physics. The degree program in biochemistry prepares students for careers in industry, medicine, teaching and research. Graduates of our program have successfully found positions in the workforce, or have continued their training in graduate programs, medical and dental schools, and other professional programs. Some of our graduates work at Ford, U-M, and Pfizer, and have attended Case Western Reserve, U-M, Wayne State, and other graduate, professional, dental, and medical schools.

The biochemistry program is part of the Department of Natural Sciences in the College of Arts, Sciences, and Letters. It ordinarily requires a minimum of 120 credit hours of study. Careful planning is required to complete this program in four years. Many students choose to do research, co-op, or other work during their program of study, and take classes part-time in biochemistry.

Students are encouraged to meet with a faculty advisor at least once a year.

Our program meets the standards suggested by the American Society of Biochemistry and Molecular Biology (ASBMB). Our program is a laboratory-rich program, allowing students to gain extensive hands-on laboratory experience. Students in advanced labs work with state-of the art equipment such as microtiterplate readers and gel electrophoresis equipment, performing labs such as protein purification, cloning, and DNA fingerprinting. A blend of traditional and cutting-edge experiments ensure that students will understand the theory and the application of the techniques to science.

## Opportunities for Undergraduate Research Experience

Research experience is an excellent opportunity to learn more science and make a contribution to scientific research. Many students do research with faculty in laboratories on campus as well as at off-campus sites. Many students present their research findings at department, local or national conferences. Some students have been co-authors on published manuscripts.

## What to Take in High School

Students interested in pursuing a biochemistry degree should have strong math, science, and written and oral communication skills. A student who has taken four years of English, mathematics, science (including biology, chemistry and physics), and three years of foreign language in high school, should be well prepared to enter the program. Knowledge of statistics and computer analysis is beneficial. Most important is a passion for understanding the intricate details of living systems.

## Courses

To receive a Bachelor of Science degree in biochemistry, students must complete prerequisite and concentration requirements in biochemistry in addition to the distribution and graduation requirements of the College of Arts, Sciences, and Letters.

*Degree-seeking students are required to fulfill the required courses in effect at the time admitted or readmitted to the program. Since these are subject to change, students should see an advisor for current requirements.*

## Prerequisite courses include:

Biological Sciences 130 and 140 (8 credit hours), Chemistry 124 and 136 or 146, 225, 226, 227 (16 credit hours), Mathematics 115, 116 (8 credit hours) and Physics 125-126 or 150-151 (8 credit hours).

***Upper-division requirements include 13 hours of biochemistry and 7 hours of chemistry lecture and laboratory classes:***

| | |
|---|---|
| Biochem 470 | Biochemistry I |
| Biochem 471 | Biochemistry II |
| Biochem 472 | Biochemistry Lab I |
| Biochem 473 | Biochemistry Lab II |
| Biochem 474 | Molecular Biology |
| Biochem 497 | Biochemistry Seminar |
| Chem 344 | Quantitative Analysis |
| Chem 368 | Physical Chemistry I |

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In addition, a minimum of three credits must be chosen from each of the three groups of courses listed below. At least one of these courses must be a lecture/laboratory course in biology.

**Group 1: 300-Level**

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| Biochem 390 | Current Topics |
| Biol 301 | Cell Biology |
| Biol 303 | Comparative Animal Physiology |
| Biol 306 | General Genetics |
| Biol 307 | Genetics Lab |
| Biol 311 | Embryology |
| Biol 335 | Plant Physiology |
| Biol 350 | Introduction to Neurobiology |
| Biol 351 | Introduction to Neurobiology (Lab) |
| Biol 385 | Microbiology |
| Chem 303 | Inorganic Chemistry I |
| Chem 352 | Toxicology |

**Group 2: 400-Level***

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|---|---|
| Biochem 480 | Biochemical Pharmacology |
| Biochem 490 | Topics in Biochemistry |
| Biol 401 | Cell Biophysics |
| Biol 406 | Microbial Genetics |
| Biol 430 | Medical Virology |
| Biol 450 | Virology |
| Biol 455 | Immunology |
| Biol 459 | Pathogenic Microbiology |
| Chem 447 | Instrumental Analysis |
| Chem 469 | Physical Chemistry II |
| Chem 479 | Biophysical Chemistry |
| Chem 481 | Physiocochemical Measurements |

**Group 3: Computational Skills**

An upper level course in mathematics, statistics or computer science offered by those departments as a prerequisite.

*For more specific details, consult the UM–Dearborn *Undergraduate Announcement.*

## Honors Degree in Biochemistry

To qualify for this honor, a student must maintain an overall grade point average of 3.5. The honors degree candidate must take six credit hours of independent study under Biochemistry 495, 498 or 499 culminating in an oral presentation and an undergraduate thesis. The Biochemistry Program Committee will evaluate the student's oral presentation and thesis.

## Minor or Area of Focus

A minor or an area of focus consists of 12 hours of upper- division credit in biochemistry.

## For More Information

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