

# BIOCHEMISTRY (M.S.)

<https://colsa.unh.edu/molecular-cellular-biomedical-sciences/program/ms/biochemistry>

## Description

The M.S. in Biochemistry combines a rigorous curriculum in biochemistry and related disciplines with interdisciplinary research opportunities at the frontiers of biochemistry, molecular biology, and cell biology. Graduates of the program are equipped for successful careers in biotechnology and pharmaceutical companies, or in academic and government research laboratories. Graduates are also prepared for doctoral programs, medical school, or other health-related professional programs.

### Distinctive Features of the Program

- Advanced course offerings include signal transduction pathways, pharmacology, physical biochemistry, proteomics, endocrinology, structural biology, bioinformatics, and cancer biology
- Emphasis on interdisciplinary research training
- Well-equipped research laboratories and core facilities on the UNH campus
- Laboratory rotations upon entry to the program to become familiar with different research laboratories
- Weekly graduate student seminar presentations, as well as a departmental seminar series of invited speakers
- Opportunities to gain teaching experiences as a Graduate Teaching Assistant
- Accelerated M.S. program available to UNH students enrolled in the B.S. program in Biochemistry, Molecular, and Cellular Biology or related disciplines.

### Research Opportunities

- Tumor cell biology
- Protein structure, function, and regulation
- Signal transduction pathways
- Molecular and cellular neuroscience
- Genomics, proteomics, and bioinformatics
- Regenerative biology
- Molecular immunology
- Chemical biology

### Financial Support

- Students admitted to the M.S. Program are typically supported by Research Assistantships or Teaching Assistantships
- Teaching Assistantships are not available for students enrolled in the Accelerated M.S. program
- Internal summer and academic year fellowships are available to students on a competitive basis.

### Career Prospects

- Research scientists in biotechnology and pharmaceutical industries
- Lab managers in academic research labs and research institutes, state and federal government agencies

- Continuing education in doctoral programs and professional health programs (e.g., medical school)

### Admission Requirements

- Completion of foundational courses in biology, chemistry (including organic chemistry), physics, and mathematics
  - Otherwise well-qualified applicants can correct academic deficiencies with enrollment in appropriate courses or independent study during the first year of graduate studies
- Applicants from non-English speaking countries must provide Test of English as a Foreign Language (TOEFL) scores
- Three letters of recommendation
- Personal statement, including research interests and identification of two or three potential Biochemistry faculty thesis advisors.

## Requirements

### M.S. Degree Requirements

Student must meet the Graduate School's requirements for the master's degree and are expected to develop a culminating thesis based on the completion of a research project. Demonstration of proficiency in biochemistry will be assessed in the first year by examination or coursework. All candidates for the M.S. degree must pass an oral examination based on the thesis or project report and on the graduate courses completed in the degree program.

**Credits:** A minimum of **30 graduate credits** is required including 6-10 master's thesis credits (MCBS 899 Master's Thesis). Graduate credits are earned for courses numbered 800-999. Up to 12 credits earned at UNH in co-listed 7XX/8XX courses may be taken for graduate credits upon approval of the Graduate School. Typically, master's students enroll in BCHM 851 Principles of Biochemistry I & BCHM 852 Principles of Biochemistry II during their first year of study, unless diagnostic examinations indicate that undergraduate preparation in general biochemistry is sufficient.

**Thesis Committee:** During the first semester, the Graduate Program Coordinator will assist the student in choosing courses. Following selection of the thesis advisor, the student and the advisor jointly agree on the members of the Thesis Committee no later than during the second semester and communicate this recommendation to the Biochemistry Graduate Program Coordinator. The Master's Supervisory Committee Nomination Form must be completed and submitted to the Graduate School. The Thesis Committee consists of the advisor as chair and two other members. The committee meets soon after selection of a thesis project to approve the student's proposed curriculum.

Courses required by the Thesis Committee must be taken for credit and completed with a passing grade (B-minus or better). Courses recommended by the committee may be audited or taken for credit, but in either case the student is expected to be familiar with the subject matter of these courses. It is recommended that the student meet with their Thesis Committee every semester to review progress of the thesis project and academics.

**Written Thesis and Oral Presentation:** Students must prepare a written master's thesis for submission to their Thesis Committee. A copy of the complete thesis must be made available to the committee at least 14 days before the date of the final examination. Consult the *Thesis*

and *Dissertation Manual* provided by the Graduate School for details on preparing the manuscript.

The oral examination of the master's thesis consists of two parts: an oral presentation of the research that is open to the public and an oral defense of the master's thesis conducted by the Thesis Committee.

Final approval of the master's thesis will be determined by an affirmative majority vote of the Thesis Committee. The final thesis must be submitted to the Graduate School via the procedures outlined in the *Thesis and Dissertation Manual*. As their program nears completion, students must submit the Intent-to-Graduate prior to the deadline posted on the Graduate School's calendar.

## Accelerated Master's

This graduate program is approved to be taken on an accelerated basis in articulation with certain undergraduate degree programs.

General Accelerated Master's policy, note that some programs have additional requirements (e.g. higher grade expectations) compared to the policy.

Please see the [Graduate School website](#) and contact the department directly for more information.

### Accelerated Master's Admission Requirements

- Current junior standing in the B.S. in Biochemistry, Molecular, and Cellular Biology program (or related programs) at the time of application
- GPA of 3.2 or greater
- Thesis advisor identified who supports entry into the program
- Two letters of recommendation (one of which is from the thesis advisor)
- Personal statement of research interests and career aspirations
- GRE is waived

## Student Learning Outcomes

### Program Learning Outcomes

#### All MCBS graduates will be able to:

- Critically apply theories, methodologies, and knowledge to address fundamental questions in their primary area of study.
- Pursue research of significance in the discipline (or an interdisciplinary or creative project). Students plan and conduct this research (or implement their project) under the guidance of an advisor, while developing intellectual independence that typifies true scholarship.
- Demonstrate skills in oral and written communication sufficient to present and publish work in their field, and to prepare grant proposals.
- Follow the principles of ethics in their field, and in academia, as well as adhere to scientific standards for rigor and reproducibility.
- Demonstrate, through service, the value of their discipline to the academy and community at large.
- Demonstrate a mastery of skills and knowledge at a level required for college and university undergraduate teaching in their discipline and assessment of student learning.

- Interact productively with individuals from diverse backgrounds in the roles of team members, leaders and mentors with integrity and professionalism.

### Graduates of the Biochemistry M.S. degree program will be able to:

- Demonstrate extensive knowledge and understanding of fundamental biochemistry principles and their area of specialization in the field.
- Critically apply theories and methodologies to address fundamental questions in biochemistry through research activities.
- Design and conduct biochemical experiments in their area of specialization, analyze and interpret research data, and draw critical conclusions.
- Communicate biochemical concepts and experimental results effectively in writing and orally both in scientific technical language as well as at an appropriate level tailored for the general audience.