

MOLECULAR AND CELLULAR BIOPHYSICS

Office: Boettcher West, Room 228
Mailing Address: 2050 E. Iliff Avenue, Denver, CO 80208
Phone: 303-871-4866
Email: kirsten.norwood@du.edu
Website: <https://science.du.edu>

Molecular and Cellular Biophysics

The Molecular and Cellular Biophysics PhD (MCB) program provides opportunities for doctoral studies in the interdisciplinary field of biophysics. Participation of faculty from the Departments of Biological Sciences, Chemistry & Biochemistry, and Physics & Astronomy enhances the strength and breadth of our program by incorporating cross-disciplinary and collaborative approaches to research. The MCB PhD program is centered on research activities that coincide with faculty experience and expertise. Areas of research in the MCB program include cellular physiology, developmental dynamics, protein folding and aggregation, protein network analysis, signal transduction cascades, synthetic biology, systems biology and the development of novel imaging techniques. Projects at the interface of traditional disciplines of physics, biology and chemistry as well as methods of mathematical analysis and computer modeling are particularly encouraged.

The MCB PhD program offers both a core foundation in biophysical theory and practice yet provides flexibility and individualized attention such that students with diverse scientific backgrounds will have the opportunity to be trained in molecular and cellular biophysics. During their first year in the program, students conduct lab rotations, take a year-long course sequence that covers foundations of molecular and cellular biophysics and take additional graduate courses to supplement their undergraduate training. At the end of their first year, students will join the lab in which they will conduct their thesis research.

Students with strong quantitative undergraduate backgrounds (e.g., undergraduate degrees in physics, chemistry, mathematics, computer science/engineering) who desire to apply these skills to various biological problems, as well as students with a background in cell or molecular biology with a solid foundation in mathematics and physics are particularly encouraged to apply. Financial aid is usually offered in the form of Graduate Teaching or Graduate Research Assistantships, which cover tuition costs and provide a stipend for living expenses.

Doctor of Philosophy in Molecular & Cellular Biophysics

Degree and GPA Requirements

- Bachelor's degree: All graduate applicants must hold an earned baccalaureate from a regionally accredited college or university or the recognized equivalent from an international institution.
- Grade point average: The minimum undergraduate GPA for admission consideration for graduate study at the University of Denver is a cumulative 2.5 on a 4.0 scale or a 2.5 on a 4.0 scale for the last 60 semester credits or 90 quarter credits (approximately two years of work) for the baccalaureate degree. An earned master's degree or higher from a regionally accredited institution supersedes the minimum standards for the baccalaureate. For applicants with graduate coursework but who have not earned a master's degree or higher, the GPA from the graduate work may be used to meet the requirement. The minimum GPA is a cumulative 3.0 on a 4.0 scale for all graduate coursework undertaken.
- Program GPA requirement: The minimum undergraduate GPA for admission consideration for this program is a cumulative 2.5 on a 4.0 scale.

Prerequisites

- A minimum of one year of calculus and one year of college physics (preferably calculus-based), regardless of undergraduate major, are required.

Standardized Test Scores

- GRE scores are optional for admission to this program. Applications submitted without scores will receive full consideration. Every application undergoes a comprehensive evaluation, including a careful review of all application materials.

If you choose to submit test scores, you may upload your Test Taker Score Report PDF, which is considered unofficial. Official scores must be received directly from the appropriate testing agency upon admission to the University of Denver. The ETS institution code to submit GRE scores to the University of Denver is 4842.

Additional Requirements

- Applicants may be contacted to schedule an admissions interview.

English Language Proficiency Test Score Requirements

The minimum TOEFL/IELTS/C1 Advanced/Duolingo English Test score requirements for this degree program are:

- Minimum TOEFL Score (Internet-based test): 80
- Minimum IELTS Score: 6.5
- Minimum C1 Advanced Score: 176
- Minimum Duolingo English Test Score: 115

English Conditional Admission: No, this program does not offer English Conditional Admission.

Doctoral Program

Doctor of Philosophy in Molecular and Cellular Biophysics

Graduate studies in the program are highly individualized; programs should fit each student's unique needs and interests. Students are required to perform original, publishable research and to present a thesis based on research to the faculty of the molecular and cellular biophysics program.

A student qualifies for the PhD degree after demonstrating growth as an independent investigator—identifying a significant research question; proposing a hypothesis or model to answer the question; testing the hypothesis with appropriate experiments; and writing a dissertation acceptable to the department.

The structure of the PhD program in Molecular and Cellular Biophysics is as follows:

- required core courses and elective courses during the first year
- required lab rotations during the first year
- required seminar/special topics courses during the second year
- qualifying exams first year and second year
- thesis research second year to completion

Degree Requirements

Coursework Requirements

Code	Title	Credits
Required Courses		
First Year		
BIOP 4100	Foundations in Biophysics	3
BIOP 4150	Cellular Biophysics	3
CHEM 3130	Chemical Systems III	3
BIOP 4995	Independent Research	1-9
Second Year		
3 quarters of BIOP 4210 are required		
BIOP 4210	Current Topics in Biophysics	2
BIOP 4210	Current Topics in Biophysics	2
BIOP 4210	Current Topics in Biophysics	2
Electives		
During the first two years electives can be chosen from existing 3000- or 4000-level courses in the Division and must be chosen with consultation and the approval of the Steering committee. This use of electives is critical given the interdisciplinary nature of this PhD program and scientific discipline and the fact that incoming students will come from a range of disciplines in the physical sciences and life sciences.		
The remainder of the credit hours required for the degree may include:		
BIOP 4992		
BIOP 4995	Independent Research	
BIOP 5995	Independent Research	
Total Credits		90

Minimum credits required for the degree: 90 (must be approved by the program Steering committee)

Non-coursework Requirements

- passing performance in the qualifying examinations
- completion of a research dissertation of publishable quality
- successful oral defense of the dissertation

Additional requirements:

- successful completion of research rotations during the first year
- maintaining a minimum GPA of 3.0
- passing performance in the qualifying examinations

- attendance at departmental seminars and the presentation of one seminar per year
- completion of a research dissertation of publishable quality
- successful oral defense of the dissertation

A complete description of the program's official requirements and details of qualifying examinations are available on the Natural Sciences & Mathematics (<http://www.du.edu/nsm/departments/molecularandcellular/>) website.

Master's Program

Master of Science in Molecular and Cellular Biophysics

The MS in Molecular and Cellular Biophysics is a terminal master's degree for students who enter the PhD in Molecular and Cellular Biophysics but demonstrate a mastery in the program that indicates an MS degree is more suitable.

Degree Requirements

Coursework Requirements

Code	Title	Credits
Required courses		
BIOP 4100	Foundations in Biophysics	3
BIOP 4150	Cellular Biophysics	3
CHEM 3130	Chemical Systems III	3
BIOP 4210	Current Topics in Biophysics (Three quarters are required.)	2
BIOP 4210	Current Topics in Biophysics (Three quarters are required.)	2
BIOP 4210	Current Topics in Biophysics (Three quarters are required.)	2
BIOP 4995	Independent Research (Student must reach a minimum of 45 credit hours with approved independent research coursework.)	1-9
Minimum Number of Credits Required		45

Minimum credits required for the degree: 45

Non-coursework requirements

- Thesis
- Oral Defense

BIOP 4100 Foundations in Biophysics (3 Credits)

Focus of the course is on application of basic physics principles to the study of cells and macromolecules. Topics include diffusion, random processes, thermodynamics, reaction equilibria and kinetics, computer modeling. Must be admitted to the MCB PhD program or related graduate program with instructor approval. Cross listed with PHYS 4100.

BIOP 4150 Cellular Biophysics (4 Credits)

Biophysical approaches to understanding cell function. We emphasize the various experimental approaches that biophysicists use to study basic cellular processes, including a variety of fluorescence images, optical and electrophysiological techniques. Cross listed with BIOL 4211.

BIOP 4210 Current Topics in Biophysics (2 Credits)

This is a seminar course that focuses on current primary literature in the fields of molecular and cellular biophysics. This is the first of a three course, year-long sequence.

BIOP 4993 Lab Rotation (2-9 Credits)

Lab rotation in Molecular and Cellular Biophysics before students pass the first phase of their qualifying exam.

BIOP 4995 Independent Research (1-9 Credits)

Independent research in Molecular and Cellular Biophysics before students pass the first phase of their qualifying exam.

BIOP 5991 Independent Study (1-10 Credits)

BIOP 5995 Independent Research (2-9 Credits)

BIOP 6991 Independent Study (1-10 Credits)

BIOP 6995 Independent Research (1-10 Credits)