MOLECULAR BIOLOGY (PHD)

Overview

The Molecular Biology Program is dedicated to providing rigorous training to its students in a supportive environment. Molecular Biology faculty are members of many different departments and are applying the techniques of molecular biology to answer questions in diverse areas. Molecular biology, the science of how living things work at the molecular level, has led the recent revolution in our understanding of human disease and gave birth to the biotechnology industry. In almost all aspects of modern biomedical research, a professional knowledge of molecular biology is essential. Our training program is designed to equip students for careers at the cutting edge of biology.

Admissions Requirements

To apply for admission applicants must submit the following:

- Online Graduate School application
  - Personal Statement
  - Research Experience explanation (more in-depth than what is provided in the resume requirement)
  - Resume: The applicant's current resume or curriculum vitae, including professional work/practice since graduating with a bachelor's degree (or equivalent).
  - Diversity, Equity and Inclusion Statement
  - Three recommendations: to be completed by people who know your professional, academic and/or personal achievements or qualities well. As such, references must be from professional contacts, such as employers, supervisors, former faculty, preceptors, or professional colleagues.
  - Official Transcripts from all post-secondary colleges and/or universities attended by the applicant.
- Application Fee: A nonrefundable application fee of $50.00 (U.S. dollars – Domestic Applicants). Checks or money orders should be made out to the University of Colorado.
- Interview: If selected, candidates will be contacted to attend a recruitment weekend[HS2] , including interviewing with current MOLB Faculty and Students.
- Transcripts: Official transcripts from all post-secondary colleges and/or universities should be sent directly to:

  University of Colorado Denver

  Graduate School

  Mail Stop C296

  Fitzsimons Building, W5107

  13001 E. 17th Place

  Aurora, CO 80045

  OR Electronic Transcripts should be sent to: graduate.school@cuanschutz.edu (preferred)

International students must meet ALL the requirements listed above along with those required by the Office of International Affairs. The application fee for international students is $75.00.

Degree Requirements

First Year

First Year		
Fall		**Hours**
BMSC 7806	Core I: Foundations in Biomedical Sciences	6
BMSC 7810	Core Topics in Biomedical Science one section from A & one section from B	2
MOLB 7650	Research in Molecular Biology sections 001 & 002	1-10
	Hours	**9-18**
Spring		
MOLB 7800	Advanced Topics in Molecular Biology	3-4
MOLB 7650	Research in Molecular Biology section 001	1-10
Elective of student's choosing		
	Hours	**4-14**
Summer		
MOLB 8990 or MOLB 7650	Doctoral Thesis in Molecular Biology or Research in Molecular Biology	1
	Hours	**1**
	Total Hours	**14-33**

Second Year

Second Year		
Fall		**Hours**
MOLB 7661	Molecular Biology Seminar	1
MOLB 7650	Research in Molecular Biology Section 0V3	1-10
MOLB 7950	Informatics and Statistics for Molecular Biology	3
	Hours	**5-14**
Spring		
MOLB 7661	Molecular Biology Seminar	1
MOLB 7650	Research in Molecular Biology Section 0V3	1-10
Elective of student's choosing		
	Hours	**2-11**
Summer		
MOLB 8990	Doctoral Thesis in Molecular Biology	1-10
	Hours	**1-10**
	Total Hours	**8-35**

Third Year through PhD Completion

Fall		**Hours**
MOLB 8990	Doctoral Thesis in Molecular Biology	5
	Hours	**5**
Spring		
MOLB 8990	Doctoral Thesis in Molecular Biology	5
	Hours	**5**
Summer		
MOLB 8990	Doctoral Thesis in Molecular Biology	1
	Hours	**1**
	Total Hours	**11**

Learning Objectives

The MOLB Program has defined five objectives that convey our approach to research and professional training.

Objective 1 is to provide broad training in foundational molecular and cellular biology with focused research opportunities in diverse disciplines (e.g., bioinformatics, cell biology, cancer biology, developmental biology, epigenetics, immunology, microbiology, RNA biology, and structural biology). Our broad interdisciplinary training is key to the success of our trainees and a defining feature of MOLB relative to other AMC training programs. The scientific breadth of our faculty exposes our trainees to many different techniques and provides opportunities for students to combine different approaches to answer their own scientific questions. We cultivate a collegial environment across the program, encouraging intellectual exchange and collaboration between labs from many departments and measure our success by the number and quality of research publications produced by our trainees and the number of external grants that they are awarded based on their research.

Objective 2 is to provide student-oriented and well-balanced training that emphasizes development of creative and independent thinking, strong communication skills, and professional responsible conduct. A key to MOLB training is its focus on developing professional skills including teamwork, science communication, project management, and leadership. The MOLB Program incorporates many technical, operational, and professional elements to provide balanced training for our students.

Objective 3 is to develop and apply the newest techniques that drive advances in science. As the late Sydney Brenner articulated, "*Progress in science depends on new techniques, new discoveries, and new ideas, probably in that order*." A primary objective of the MOLB Program is to position our graduates to lead the forefront of scientific technology deployment and development. We develop scientists who are well-versed in existing scientific techniques and capable of developing their own experimental approaches to answer new questions. We combine rigorous "wet" and "dry" laboratory training, intensive discussion of current literature, workshops, and mini-courses that focus on emerging techniques for molecular and cell biology research, and we measure our success by our trainees' performance in preliminary and comprehensive examinations, and laboratory research.

Objective 4 is to create and sustain an inclusive and diverse research training environment. We value diversity in our program and the scientific community, and developed several approaches to increase the cultural, racial, and social diversity in the MOLB Program. Some of these include MOLB-specific recruitment and retention strategies and diversity training for our faculty and students.

Objective 5 is to promote the career advancement of our trainees and introduce them to a broad range of career choices. The MOLB program provides skills and opportunities for experiential learning needed to succeed in many science-related careers, including academic research, consulting, teaching, government and public policy, technology transfer and patent law, science writing, and science communication, and measure our success by the diversity of science-related careers that our trainees pursue.

Course Descriptions

Course Descriptions (Per Course)

BMSC 7806 - Core I: Foundations in Biomedical Sciences (6 Credits)
Course will focus on the fundamental principles of biomedical sciences. Lectures and recitations/discussions will primarily address the basics of molecular biology, biochemistry, genetics, cell biology and energetic principles. Course is typically limited to biomedical science PhD and BSBT MS students. Previously offered as IDPT 7806
Grading Basis: Letter Grade
Repeatable. Max Credits: 6.
Typically Offered: Fall.

BMSC 7810 - Core Topics in Biomedical Science (2 Credits)
Sections focus on different core topics in biomedical science, and will address subject areas such as protein structure and function, neurobiology, embryology, stem cell research, and cancer biology. Students can enroll in multiple Core Topic Courses topics in one semester. Previously offered as IDPT 7810.
Grading Basis: Letter Grade
Repeatable. Max Credits: 20.
AMC-PHD PhD Students only
Typically Offered: Fall.

MOLB 7650 - Research in Molecular Biology (1-10 Credits)
Research work in molecular biology. Prereq: Consent of the instructor.
Grading Basis: Letter Grade with IP
Repeatable. Max Credits: 99.
A-GRAD Restricted to graduate students only.
Typically Offered: Fall, Spring, Summer.

MOLB 7661 - Molecular Biology Seminar (1 Credit)
Seminar series provides a forum for the presentation of scientific experiments and information in molecular biology by faculty, postdoctoral fellows, graduate students and invited outside guest speakers.
Grading Basis: Letter Grade
A-GRAD Restricted to graduate students only.
Typically Offered: Fall, Spring.

MOLB 7800 - Advanced Topics in Molecular Biology (3-4 Credits)
Course instructs graduate students how to critically evaluate scientific literature. Course in 4 blocks; topics include nucleic acid, chromatin structure, DNA replication, RNA transcription, RNA processing, cell cycle control, genetics of model organisms. Papers chosen by instructors, presentations by students. Prereq: IDPT 7811, 7812, 7813, 7814, 7815. Restriction: By Permission of instructor. Course offered in 4 blocks of 1 hour of credit each.
Grading Basis: Letter Grade
Repeatable. Max Credits: 4.
A-GRAD Restricted to graduate students only.
Typically Offered: Spring.

MOLB 7950 - Informatics and Statistics for Molecular Biology (3 Credits)

This course covers the design and analysis of common molecular biology experiments with thorough coverage of statistical and informatic approaches to data analysis. The course begins with a "boot camp" that covers use of shell programming, R/R Studio, and Python scripting in bioinformatics. Pre-Req: MOLB-PhD or CSDV-PhD students only
Grading Basis: Letter Grade
A-GRAD Restricted to graduate students only.
Typically Offered: Fall.

MOLB 8990 - Doctoral Thesis in Molecular Biology (1-10 Credits)
Doctoral thesis work in molecular biology. Prereq: Consent of Instructor.
Grading Basis: Letter Grade with IP
Repeatable. Max Credits: 99.

A-GRAD Restricted to graduate students only.
Additional Information: Report as Full Time.
Typically Offered: Fall, Spring, Summer.

```
MOLB 7900 - Practical Computational Biology for Biologists: Python
The goals of the course are to familiarize students with the basic
 tenets of Python programming such that, at the completion of
 the course, they can write basic software and scripts that will
 enable them to derive meaning from the large datasets typical of
 modern biology.
Grading Basis: Letter Grade.
Additional Information: Students need to complete Bioinformatics
 course prior to this course.
Typically Offered: Spring.
```

Policies

Please refer to the Graduate School Policies page (http://catalog.ucdenver.edu/cu-anschutz/schools-colleges-programs/graduate-school/#policiestext).

Contact Us

Rytis Prekeris, Ph.D.
Program Director
rytis.prekeris@cuanschutz.edu
https://www.prekerislab.com/
@prekerislab (https://x.com/prekerislab/?t=2fNbOJq9a9NA1rHVXbcy4A&s=09)

Michael McMurray, Ph.D.
Associate Program Director
michael.mcmurray@cuanschutz.edu
https://medschool.cuanschutz.edu/cell-and-developmental-biology/faculty/michael-mcmurray (https://medschool.cuanschutz.edu/cell-and-developmental-biology/faculty/michael-mcmurray/)

```
Trudie Steenhof
Program Administrator
trudie (Trudie.Steenhof@cuanschutz.edu).steenhof@cuanschutz.edu
 (sabrena.heilman@cuanschutz.edu)MOLB@cuanschutz.edu
303.724.5082
University of Colorado Anschutz Medical Campus
12801 E 17th Avenue
Mail Stop 8116
Aurora, CO 80045
```