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, including interviewing with current MOLB Faculty and Students.

- Transcripts: Official transcripts from all post-secondary colleges and/or universities attended by the applicant.

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

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Section</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMSC 7806</td>
<td>Core I: Foundations in Biomedical Sciences</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>BMSC 7810</td>
<td>Core Topics in Biomedical Science</td>
<td>one section from A &amp; one section from B</td>
<td>2</td>
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<tr>
<td>MOLB 7650</td>
<td>Research in Molecular Biology</td>
<td>sections 001 &amp; 002</td>
<td>1-10</td>
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Spring

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<tr>
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<tbody>
<tr>
<td>MOLB 7800</td>
<td>Advanced Topics in Molecular Biology</td>
<td>3-4</td>
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<tr>
<td>MOLB 7650</td>
<td>Research in Molecular Biology</td>
<td>1-10</td>
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Elective of student’s choosing

<table>
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<tr>
<th>Hours</th>
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<tbody>
<tr>
<td>4-14</td>
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Second Year

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<tbody>
<tr>
<td>MOLB 7661</td>
<td>Molecular Biology Seminar</td>
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<tr>
<td>MOLB 7650</td>
<td>Research in Molecular Biology</td>
<td>Section 0V3</td>
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<tr>
<td>MOLB 7950</td>
<td>Informatics and Statistics for Molecular Biology</td>
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Summer

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<tr>
<th>Course</th>
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<tbody>
<tr>
<td>MOLB 8990</td>
<td>Doctoral Thesis in Molecular Biology</td>
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Total Hours

| 14-33 |

Third Year through PhD Completion

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<th>Hours</th>
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<tbody>
<tr>
<td>MOLB 8990</td>
<td>Doctoral Thesis in Molecular Biology</td>
<td>1-10</td>
</tr>
</tbody>
</table>

Total Hours

| 8-35 |

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

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