MOLECULAR BIOLOGY INTERDISCIPLINARY MINOR

Molecular and Radiological Biosciences Building, Room 111
(970) 491-5602
bmb.colostate.edu/undergraduate-students/ (https://www.bmb.colostate.edu/undergraduate-students/)

Coordinated by a Faculty Advisory Board

Erwin Chargaff referred to molecular biology as “the practice of biochemistry without a license” due to the fact that most early molecular biologists were trained as chemists or physicists. This also serves to emphasize that molecular biology is an interdisciplinary field, primarily the study of macromolecular structure and of the replication and expression of the information in our hereditary material (DNA). Jacques Monod defined molecular biology as “the recognition that the essential properties of living beings could be interpreted in terms of the structures of their macromolecules.”

Molecular biology is becoming increasingly recognized as a significant area of study, particularly for students interested in the rapidly emerging field of biotechnology. The course requirements for this program complement extant life science degree programs on campus. The Molecular Biology Interdisciplinary Minor—noted on the transcript—will provide recognition that the student has completed a body of course work that provides both breadth and depth in this area. This program provides students with a strong, well-balanced background in the biological, physical, and mathematical sciences. It is ideally suited for undergraduates who wish to pursue advanced degrees in biochemistry, microbiology, molecular biology, or related life sciences; for pre-professional students in health-related fields; and for students interested in employment in the biotechnology industry. The program includes study of macromolecular structure and function; cellular biochemistry; metabolism; gene expression, DNA structure, replication, and repair; cell organization, communication, growth, aging, and death. Courses in physics, organic chemistry, statistical measurements, and research methods are required. Independent study, internships, or advanced research-oriented laboratory classes are taken during the junior and senior years to provide opportunities for experiential learning and working closely with an interdisciplinary group of faculty.

Students interested in participating in this program should contact the Department of Biochemistry and Molecular Biology (http://www.bmb.colostate.edu/) in the Molecular and Radiological Biosciences Building, Room 111, (970) 491-5602.

Effective Fall 2023

Students must satisfactorily complete the total credits required for the minor. Minors and interdisciplinary minors require 12 or more upper-division (300- to 400-level) credits.

Additional coursework may be required due to prerequisites.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>MATH 155</td>
<td>Calculus for Biological Scientists I (GT-MA1)</td>
<td>4</td>
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<tr>
<td>or MATH 160</td>
<td>Calculus for Physical Scientists I (GT-MA1)</td>
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<tr>
<td>STAT 301</td>
<td>Introduction to Applied Statistical Methods</td>
<td>3</td>
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or STAT 307 Introduction to Biostatistics

Physics Core
Select one group from the following:

Group A:
- PH 121 & PH 122 General Physics I (GT-SC1) and General Physics II (GT-SC1)

Group B:
- PH 141 & PH 142 Physics for Scientists and Engineers I (GT-SC1) and Physics for Scientists and Engineers II (GT-SC1)

Chemistry Core
- CHEM 111 General Chemistry I (GT-SC2) 4
- CHEM 112 General Chemistry Lab I (GT-SC1) 1
- CHEM 113 General Chemistry II 3
- CHEM 114 General Chemistry Lab II 1
- CHEM 345 Organic Chemistry I 4
- CHEM 346 Organic Chemistry II 4

Biology Core
Select one group from the following:

Group A:
- BZ 310 Cell Biology 4-5

Group B:
- LIFE 210 & LIFE 212 Introductory Eukaryotic Cell Biology and Introductory Cell Biology Laboratory 4
- LIFE 102 Attributes of Living Systems (GT-SC1) 4

Biochemistry Core
- BC 401 Comprehensive Biochemistry I 3
- BC 403 Comprehensive Biochemistry II 3
- BC 404 Comprehensive Biochemistry Laboratory 2

Microbiology Core
- MIP 300 General Microbiology 3
- MIP 342 Immunology 4

Molecular Genetics Core
- BC 463 Molecular Genetics 3
- or MIP 450 Microbial Genetics 2

Select one group from the following:

Group A:
- BZ 350 Molecular and General Genetics 4-6

Group B:
- LIFE 201B & LIFE 203 Introductory Genetics: Molecular/Immunological/Developmental (GT-SC2) and Introductory Genetics Laboratory 4

Group C:
- SOCR 330 Principles of Genetics and Genetics Laboratory 1

Seminar
- BC 493 Senior Seminar 1

Selected Courses
Select one course from the following: 3-4
- BC 465 Molecular Regulation of Cell Function
- BZ 433 Behavioral Genetics
- MIP 420 Medical and Molecular Virology
<table>
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<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>MIP 443</td>
<td>Microbial Physiology</td>
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<tr>
<td><strong>Advanced Laboratory</strong></td>
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<td>Select four credits from the following: 4</td>
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<tr>
<td>BC 475</td>
<td>Mentored Research</td>
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<tr>
<td>BC 495</td>
<td>Independent Study</td>
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<tr>
<td>BC 499A</td>
<td>Thesis: Laboratory Research-Based</td>
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<td>BC 499B</td>
<td>Thesis: Literature Based</td>
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<tr>
<td>BC 499D</td>
<td>Thesis: Literature-based in Pre-Pharmacy</td>
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<tr>
<td>BZ 495</td>
<td>Independent Study</td>
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<tr>
<td>MIP 302</td>
<td>General Microbiology Laboratory</td>
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<tr>
<td>MIP 343</td>
<td>Immunology Laboratory</td>
</tr>
<tr>
<td>MIP 425</td>
<td>Virology and Cell Culture Laboratory</td>
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<tr>
<td>MIP 495</td>
<td>Independent Study</td>
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**Program Total Credits:** 72-75