Molecular Biology, B.S.

To obtain a B.S. degree in molecular biology, a student, with the aid of a molecular biology adviser, designs a program of study that includes courses from the Molecular Biology General Science Core and Elective Requirements listed below. Additional course lists are provided as an aid in developing an individualized program of study in key Emphasis Areas such as Cell Biology and Molecular Genetics, Microbiology, and Preprofessional Health Sciences. Courses listed under the Emphasis Areas are optional, and the student and adviser will design a unique curriculum suited to the student's personal interests. Flexibility in course selection also permits students to fulfill various requirements for postgraduate and professional schools. Completion of a B.S. in Molecular Biology provides a student with the tools needed to open the door to exciting futures in science, medicine and agriculture.

We expect that our graduating students will have a strong foundation in basic science, biochemistry and molecular biology that will enable them to:

1. understand the basis of multiple molecular mechanisms central to gene expression;
2. utilize molecular and microbiological laboratory techniques in future jobs or programs and trouble-shoot experimental challenges;
3. apply for graduate programs in molecular biology, microbiology or other life sciences;
4. begin employment as a laboratory research assistant in academia or the medical or agricultural biotechnology industries;
5. utilize a background in biochemistry and cell and molecular biology to promote success in the basic science curriculum in medical or other health professional schools;
6. integrate a background in biochemistry and cell and molecular biology into career development in professions such as law, genetic counseling, or public health policy;
7. employ evidence-based scientific reasoning skills in evaluating the use of molecular genetics in the prevention, diagnosis and treatment of medical disorders.

Requirements for Molecular Biology Majors

General Requirements

- Total credits (college requirement): 120
- 3000-level or above credits (university requirement): 42
- Fulfillment of University Studies Program (consult adviser)
- Fulfillment of molecular biology general science, core and elective requirements listed below

MOLB Requirements

General Science Requirement

<table>
<thead>
<tr>
<th>Course Name</th>
<th>Credits:</th>
<th>Term Taken</th>
<th>Grade</th>
<th>Gen Ed</th>
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<tbody>
<tr>
<td>LIFE1010 - General Biology</td>
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<tr>
<td>CHEM1020 - General Chemistry I</td>
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<td>CHEM1030 - General Chemistry II</td>
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<td>CHEM2420 - Organic Chemistry I</td>
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<td>CHEM2440 - Organic Chemistry II</td>
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<tr>
<td>PHYS1110 - General Physics I</td>
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<td>PHYS1120 - General Physics II</td>
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<td>MATH2200 - Calculus I *</td>
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<tr>
<td>STAT2050 - Fundamentals of Statistics</td>
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Total: 36 Credits

*The alternative math courses MATH 1450 or MATH 1400 and MATH 1405 may be substituted with adviser approval.

MOLB Core Requirement

<table>
<thead>
<tr>
<th>Course Name</th>
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<tr>
<td>LIFE3050 - Genetics</td>
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<tr>
<td>MOLB3320 - Molecular Biological Methods</td>
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<tr>
<td>MOLB3610 - Principles of Biochemistry</td>
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<td>OR</td>
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<tr>
<td>CHEM4400 - Biological Chemistry</td>
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</table>
MOLB4600 - Advanced Biochemistry  
Credits: 3

MOLB4053 - Communications in Molecular Biology  
Credits: 3

MOLB4440 - Microbial Genetics  
Credits: 3

**OR**

MOLB4450 - Cell and Developmental Genetics  
Credits: 3

MOLB4670 - Advanced Molecular Cell Biology  
Credits: 3

MOLB4051 - Departmental Seminar  
Credits: 1

**OR**

MOLB4052 - Summer Seminar  
Credits: 1

**Total: 28-29 Credits**

### MOLB Elective Requirement (6 credits)

Courses from the following list that were not used to fulfill the MOLB Core Requirement may be applied to the MOLB Elective Requirement; a maximum of 3 credits of MOLB 4010 may be counted toward the MOLB Elective Requirement.

<table>
<thead>
<tr>
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<tbody>
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<tr>
<td>MOLB4260 - Quantitative Microscopy</td>
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<td>MOLB4400 - Immunology</td>
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<td>MOLB4450 - Cell and Developmental Genetics</td>
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<tr>
<td>MOLB4460 - Microbial Physiology and Metabolism</td>
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<tr>
<td>MOLB4540 - Microbial Diversity and Ecology</td>
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<tr>
<td>MOLB4680 - Signaling in Host-microbe Interaction</td>
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**Total: 6 Credits**

### Molecular Biology Emphasis Areas

After discussing individual interests with a molecular biology adviser, a student should enroll in additional courses that will enhance preparation for a chosen career objective. Listed below are recommended courses that are not required but will further develop a student’s skills and understanding in three Emphasis Areas.

#### Cell Biology and Molecular Genetics

<table>
<thead>
<tr>
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<tr>
<td>MOLB4450 - Cell and Developmental Genetics</td>
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<tr>
<td>MOLB4610 - Biochemistry 2: Molecular Mechanisms</td>
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<tr>
<td>MOLB4680 - Signaling in Host-microbe Interaction</td>
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<tr>
<td>ZOO4280 - Introduction to Neuroscience</td>
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<td>ZOO4340 - Developmental Biology and Embryology</td>
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#### Microbiology

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<td>MICR2220 - Pathogenic Microbiology</td>
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<td>MICR4130 - Mammalian Pathobiology</td>
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<td>MICR4220 - Molecular Mechanisms of Bacterial Pathogenesis</td>
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<tr>
<td>MICR4360 - Medical Entomology and Parasitology</td>
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<tr>
<td>MOLB4010 - Laboratory Research in Molecular Biology</td>
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<td>MOLB4680 - Signaling in Host-microbe Interaction</td>
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<tr>
<td>MICR4710 - Medical Virology</td>
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# Preprofessional Health Sciences

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<tbody>
<tr>
<td>MOLB4010 - Laboratory Research in Molecular Biology</td>
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<tr>
<td>MOLB4100 - Clinical Biochemistry</td>
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<tr>
<td>MOLB4400 - Immunology</td>
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<tr>
<td>MOLB4450 - Cell and Developmental Genetics</td>
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<tr>
<td>MOLB4610 - Biochemistry 2: Molecular Mechanisms</td>
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<td>MICR2220 - Pathogenic Microbiology</td>
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<td>MICR4710 - Medical Virology</td>
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<tr>
<td>PHCY3450 - Foundational Pathophysiology</td>
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<tr>
<td>PSYC1000 - General Psychology</td>
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<tr>
<td>PSYC2210 - Drugs and Behavior</td>
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<td>PSYC2340 - Abnormal Psychology</td>
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<tr>
<td>SOC1000 - Sociological Principles</td>
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<td>SOC3550 - Medical Sociology</td>
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<tr>
<td>KIN2040 - Human Anatomy</td>
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<td>KIN2041 - Human Anatomy Laboratory</td>
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<td>ZOO3115 - Human Systems Physiology</td>
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<td>ZOO425 - Integrative Physiology</td>
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<td>ZOO4280 - Introduction to Neuroscience</td>
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<tr>
<td>ZOO4340 - Developmental Biology and Embryology</td>
<td>Credits: 4</td>
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## Recommended Course Sequence

In order to fulfill course prerequisites in a timely manner, the following sequence of courses is recommended. This plan does not list other university requirements, electives, study abroad or undergraduate research opportunities, as these may be placed in many different locations in a student’s overall academic plan. Transfer students who have completed 2 years at Wyoming Community colleges or at other universities are encouraged to take MOLB 3610 in the summer semester preceding the fall semester of their junior year or in the fall semester of their junior year at the latest, MOLB 3320 in spring semester junior year, and MOLB 4600 in fall semester senior year. Students interested in taking full advantage of the educational and undergraduate research opportunities in the Department of Molecular Biology may opt to complete their undergraduate degree in five years.

## Freshman Year: Fall

<table>
<thead>
<tr>
<th>Course Name</th>
<th>Credits:</th>
<th>Term Taken</th>
<th>Grade</th>
<th>Gen Ed</th>
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<tbody>
<tr>
<td>LIFE1010 - General Biology</td>
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<tr>
<td>CHEM1020 - General Chemistry I</td>
<td>Credits: 4</td>
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<tr>
<td>MATH2200 - Calculus I</td>
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<tr>
<td>MOLB1101 - First-Year Seminar: Genetic Engineering and Synthetic Biology</td>
<td>Credits: 3</td>
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<td>OR other USP First-Year Seminar</td>
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## Freshman Year: Spring

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<tbody>
<tr>
<td>MOLB2021 - General Microbiology</td>
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<tr>
<td>CHEM1030 - General Chemistry II</td>
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<td>STAT2050 - Fundamentals of Statistics</td>
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## Sophomore Year: Fall

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<td>• USP COM2 Credits: 3</td>
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<td>LIFE3050 - Genetics</td>
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## Sophomore Year: Spring

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<tbody>
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<td>CHEM2440 - Organic Chemistry II</td>
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https://acalogcatalog.uwyo.edu/preview_degree_planner.php?catoid=4&poid=1075&returnto=779&print
### Junior Year: Fall

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<td>MOLB3610 - Principles of Biochemistry</td>
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### Junior Year: Spring

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<td>PHYS1110 - General Physics I</td>
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OR

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<tr>
<td>MOLB4600 - Advanced Biochemistry</td>
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### Senior Year: Fall

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<tbody>
<tr>
<td>MOLB4670 - Advanced Molecular Cell Biology</td>
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OR

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### Senior Year: Spring

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OR

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<td>MOLB4000-level elective</td>
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### Notes:

- MOLB 4000-level elective Credits: 3 or 4