**PH.D. IN CELL AND MOLECULAR BIOLOGY**

The graduate program in Cell and Molecular Biology is an interdisciplinary degree-granting program that involves over 100 faculty members from 16 departments and 5 colleges who share common interests in cell and molecular biology. The program offers training leading to the M.S. and Ph.D. degrees in Cell and Molecular Biology; there also is a Cancer Biology Specialization (https://catalog.colostate.edu/general-catalog/ university-wide-programs/interdisciplinary-studies/cell-molecular- biology/phd-cell-molecular-cancer-biology-specialization/). The program includes a core of lecture courses in advanced molecular genetics and cell biology, laboratory research techniques, and ethical conduct of science. The program also includes elective courses in specialized areas and in grant writing, a graduate seminar series in which students present research, and a weekly seminar series for presentations by CSU faculty and nationally prominent scientists each year. Core courses typically are completed during the first year. On average, the M.S. degree is completed within two years, and the Ph.D. degree within five years.

Current focus areas of research include, but are not limited to the following: Cancer Biology; Gene Expression; Genome Structure, Evolution & Repair; Infectious Disease; Metabolism & Physiology; Microbiomes; Plant Molecular Biology; Prions & Neurobiology; Stem Cells & Development; and Synthetic Biology. Students are encouraged to complete coursework in computational / quantitative approaches.

Students interested in this graduate program should refer to the Cell and Molecular Biology website for further details.

**Requirements**

**Effective Fall 2021**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>BC 563</td>
<td>Molecular Genetics</td>
<td>4</td>
</tr>
<tr>
<td>BC 565</td>
<td>Molecular Regulation of Cell Function</td>
<td>4</td>
</tr>
<tr>
<td>CM 510</td>
<td>Introduction to Cell and Molecular Biology</td>
<td>1</td>
</tr>
<tr>
<td>CM 792</td>
<td>Cell and Molecular Biology Seminar 1-2</td>
<td>4-10</td>
</tr>
<tr>
<td>CM 793</td>
<td>Seminar 1-2</td>
<td>4-10</td>
</tr>
<tr>
<td>GRAD 550</td>
<td>STEM Communication</td>
<td>1</td>
</tr>
<tr>
<td>MIP 611</td>
<td>Advanced Microbiological Research Methods</td>
<td>4</td>
</tr>
</tbody>
</table>

Independent Study and Dissertation (select a minimum of 6 credits from the following):

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>CM 795</td>
<td>Independent Study 2</td>
<td></td>
</tr>
<tr>
<td>CM 799</td>
<td>Dissertation 2</td>
<td></td>
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</tbody>
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**Electives must contain at least one course from each section list:**

- **Ethics Electives**
  - Select at least one course from the following:
    - BC 601 Responsible Conduct in Biochemistry 1
    - CM 601 Responsible Conduct of Research in CMB 1
    - CM 666/PHIL 666 Science and Ethics 3
    - GRAD 544 Ethical Conduct of Research 1
    - MIP 654 Research Policies and Regulations 1
    - NSCI 575/GRAD 575 Ethical Issues in Big Data Research 1

- **Statistics Electives**
  - Select at least one course from the following:
    - STAR 511 Design and Data Analysis for Researchers I 4
    - STAR 512 Design and Data Analysis for Researchers II 4
    - STAT 540 Data Analysis and Regression 3
    - VS 562 Applied Data Analysis 3
    - VS 733 Advanced Veterinary Epidemiology 4

- **Topics Electives**
  - Topics Electives provide guided practice in reading, interpreting, and critiquing scientific literature relevant to the field of Cell & Molecular Biology.
  - Select at least one course from the following:
    - CM 700 Critical Analysis of Scientific Literature 2

- **Courses that could substitute for CM 700 in consultation with advisor:**
  - Select at least one course from the following:
    - NSW 502B Topics in Plant Pathology: Plant Bacteriology 1
    - BMS 796A/796C Group Study: Topics in Neuroscience 1-4
    - BMS 796B Group Study: Cardiopulmonary Physiology 1-18
    - BMS 796C Group Study: Reproductive Physiology 1-18
    - CHEM 651B Special Topics in Chemistry: Inorganic Chemistry 1-4
    - FSHN 650A Recent Developments in Human Nutrition: Protein, Vitamins, and Minerals 2
    - FSHN 650B Recent Developments in Human Nutrition: Carbohydrates, Lipids, and Energy 2
    - FSHN 650C Recent Developments in Human Nutrition: Genomic, Proteomics, and Metabolomics 2
    - MIP 700 Topics in Microbiology 1
    - SOCR 730 Topics in Plant Breeding and Genetics 1

- **Writing Electives**
  - Select at least one course from the following:
    - BC 701 Grant Proposal Writing and Reviewing 1
    - BSPM 530/530 Scientific Writing 1
    - BZ 544 Presenting Research in Biology 2
    - CM 640 Creative Science Writing 3
    - HES 700 Professional Skills in Bioenergetics 3

**Program Total Credits:**

Program Total Credits: 72
A minimum of 72 credits are required to complete this program.

1 CM 792 and CM 793 must be taken each year in spring or fall semester.

2 Students must complete at least one credit from each CM 795 and CM 799, and select enough independent study, dissertation, seminar, and other elective course credits to bring the program total to a minimum of 72 credits, with approval of graduate advisory committee.