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 17 departments and 6 colleges who share common interests in cell and molecular biology. The PhD program includes core coursework in molecular genetics and cell biology and rigorous and reproducible research. Elective courses cover specialized areas, including grant writing, ethical conduct of research and statistics. Two alternating graduate seminar series allow students to present their research and to attend presentations by CSU faculty and nationally prominent scientists. Core courses typically are completed during the first year and most students advance to candidacy by the end of their 5th semester. The PhD degree can generally be completed within five years. There is an option to include a Cancer Biology Specialization (https://catalog.colostate.edu/general-catalog/university-wide-programs/interdisciplinary-studies/cell-molecular-biology/phd-cell-molecular-cancer-biology-specialization/).

Most students admitted to the PhD program rotate through three laboratories in their first year to identify a PhD advisor. Current focus areas of research include, but are not limited to, <u>Cancer Biology; Gene</u> <u>Expression; Genome Structure, Evolution & Repair; Infectious Disease;</u> <u>Metabolism & Physiology; Microbiomes; Plant</u> Molecular Biology; <u>Prions & Neurobiology; Stem Cells & Development; Synthetic Biology</u> and STEM Communication. Students are encouraged to complete coursework in computational/quantitative approaches, and an emphasis is placed on effective communication with various audiences. The CMB program supports a student association and aims to create an inclusive and welcoming culture for all.

Students interested in this program should refer to the Graduate and Professional Bulletin (http://catalog.colostate.edu/general-catalog/ graduate-bulletin/) or visit the Cell and Molecular Biology website for further details.

Program Learning Objectives

Graduates from our program will have strong foundations in core cell and molecular biology <u>principles</u>, state-of-the-art training in technical laboratory and <u>computational skills</u>, and <u>leadership and</u> communication skills necessary for professional achievement. <u>After completing</u> the Ph.D. program, students will#be able to:

- Demonstrate and apply detailed knowledge of the molecular processes by which genetic material is replicated, expressed, and regulated and/or the cellular processes involved in membrane formation, organelle biogenesis, cell communication/ shape/motility and how these are linked with growth, aging, and death.
- Evaluate primary research papers in the field of cell and molecular biology, including discerning the major questions/hypotheses being addressed, critically interpreting the data presented, assessing whether the conclusions are adequately supported by evidence, and relating the findings to the broader context and significance in the field.

<u>Apply appropriate, ethical, and technically competent research</u> <u>practices</u> to generate and analyze data and determine statistical and biological relevance. • Write publication-quality scientific manuscripts in the field of cell and molecular biology based on research findings.

Formulate new hypotheses based on the literature in the field of cell and molecular biology and design appropriate experimental and analytical approaches to test them and refine those approaches/ hypotheses based on initial findings.

Institutional Learning Objectives

The curriculum for the program is aligned with CSU's institutional learning objectives (creativity, reasoning, communication, responsibility, and collaboration) in the following ways:

- First, through a combination of coursework and research experience, students will be trained to develop novel hypotheses that address fundamental questions in the field of cell and molecular biology and/ or design creative approaches to test those hypotheses.
- <u>Second, students will develop critical thinking and reasoning</u> <u>skills</u> to <u>interpret findings from</u> the <u>scientific literature and</u> their <u>own</u> <u>research data.</u>
- Third, students will gain experience in multiple modes of science communication, including writing (research papers and literature reviews), oral presentations (talks at program seminars and research conferences), and visualization (figures in papers, talk slides, and poster presentations).
- Fourth, students will become responsible members of the scientific community through mentorship, workshops, and courses on ethical, rigorous, and reproducible conduct of research.
- Fifth, students will complete their studies within a collaborative and interdisciplinary environment with a curriculum designed to support cohorts of students distributed across colleges, departments and campuses at CSU.