

PH.D. IN CELL AND MOLECULAR BIOLOGY, CANCER BIOLOGY SPECIALIZATION

Graduates from our program will have strong foundations in core cell and molecular biology principles, state-of-the-art training in technical laboratory and computational skills, and leadership and communication skills necessary for professional achievement. The Cancer Biology Specialization is a focus area within the Cell and Molecular Biology graduate program that includes over two dozen faculty members from six departments in three colleges who share a strong interest and a broad expertise in molecular and clinical aspects of the development and treatment of cancer. The basic science and translational research activities of the focus area are closely linked with the clinical research and clinical trials programs of the **Robert H. and Mary G. Flint Animal Cancer Center**. (<https://www.csuanimalcancercenter.org/>)

Clinical cancer treatment of pet animals is a major strength of the cancer biology curriculum. The Cancer Biology Specialization combines nationally recognized research training, focused on cutting edge approaches to cancer diagnosis and treatment, with innovative clinical trials. Students who choose the Cancer Biology Specialization complete all of the requirements of the Cell and Molecular Biology graduate program, including the three laboratory rotations during their first year, plus an additional 5 credits of coursework.

Students interested in graduate work 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 principles, state-of-the-art training in technical laboratory and computational skills, and leadership and communication skills necessary for professional achievement. After completing the Ph.D. program with a Cancer Biology Specialization, 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.
- Apply appropriate, ethical, and technically competent research practices 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.
- Synthesize detailed knowledge regarding the development, metastasis, diagnosis, and treatment of cancer acquired through their coursework and research.

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.
- Second, students will develop critical thinking and reasoning skills to interpret findings from the scientific literature and their own research data.
- 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.