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

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

Requirements Effective Fall 2021

A maximum of 30 credits at the master's degree level may be accepted toward the Ph.D. A professional post baccalaureate degree in Medicine, Veterinary Medicine, Dentistry, or Pharmacy may be accepted for a maximum of 30 credits.

Code	Title	Credits
Required Courses		
BC 563	Molecular Genetics	4
BC 565	Molecular Regulation of Cell Function	4
CM 510	Introduction to Cell and Molecular Biology	1
CM 792	Cell and Molecular Biology Seminar [1, 2]	4-10
CM 793	Seminar [1, 2]	4-10
GRAD 550	STEM Communication	1
MIP 611	Advanced Microbiological Research Methods	4
Select a minimum of five credits from the following:		**5**
ERHS 510/VS 510	Cancer Biology	
ERHS 611	Cancer Genetics	
ERHS 733	Environmental Carcinogenesis	
VS 718	Cancer Biology Clinical Practicum	
Independent Study and Dissertation (select a minimum of 6 credits from the following):		**6**
CM 795	Independent Study [2]	
CM 799	Dissertation [2]	
Electives must contain at least one course from each section list: [2]		**39**
Ethics Electives (See list below)		1-3
Statistics Electives (See list below)		3-4
Topics Electives (See list below)		2
Writing Electives (See list below)		1-3
Master's Degree Credit (a maximum of 30 credits may be accepted from a master's degree)		30
Program Total Credits:		**72**

Ethics Electives

Code	Title	Credits
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

Code	Title	Credits
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.

Code	Title	Credits
Preferred course, to be taken two semesters, 2 credits total:		
CM 700	Critical Analysis of Scientific Literature	2
Courses that could substitute for CM 700 in consultation with advisor:		
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

Writing Electives

Code	Title	Credits
Select at least one course from the following:		
BC 701	Grant Proposal Writing and Reviewing	1
BZ 544	Presenting Research in Biology	2
CM 644/E 644	Creative Science Writing	3
HES 700	Professional Skills in Bioenergetics	3

MIP 643	Grant Writing for Microbiology/Pathology	1
MIP 666	Writing Scientific Manuscripts	3
NB 771	Writing, Submitting, and Reviewing Grants	1

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.