

CELL AND MOLECULAR BIOLOGY: CANCER BIOLOGY, PHD

Cell and Molecular Biology

The Cell and Molecular Biology Graduate Group (CAMB) is an interdisciplinary graduate program, providing rigorous training in modern cell and molecular biology, preparing students for leadership careers in biomedical research. Within this integrated program are six discipline areas: Cancer Biology (p. 1); Cell Biology, Physiology, and Metabolism (<http://catalog.upenn.edu/graduate/programs/cell-molecular-biology-cell-biology-physiology-metabolism-phd>); Developmental, Stem Cell and Regenerative Biology (<http://catalog.upenn.edu/graduate/programs/cell-molecular-biology-developmental-stem-cell-regenerative-biology-phd>); Gene Therapy and Vaccines (<http://catalog.upenn.edu/graduate/programs/cell-molecular-biology-gene-therapy-vaccines-phd>); Genetics and Epigenetics (<http://catalog.upenn.edu/graduate/programs/cell-molecular-biology-genetics-epigenetics-phd>); and Microbiology, Virology and Parasitology (<http://catalog.upenn.edu/graduate/programs/cell-molecular-biology-microbiology-virology-parasitology-phd>). Program faculty include more than 300 scientists representing 35 departments from the Perelman School of Medicine, the Schools of Arts and Sciences, Dental Medicine, and Veterinary Medicine, Children's Hospital of Philadelphia, the Wistar Institute and Fox Chase Cancer Center. The research efforts of these scientists are diverse in their focus, experimental system, methodology, and represent the leading edge of basic and translational biomedical science.

Students from colleges and universities around the nation and the world are enrolled in the program, selecting one discipline area based on their scientific interests, yet have access to the full breadth of curricular and research opportunities provided by this large and diverse program. Our students participate in core courses in cell and molecular biology, specialized coursework in one or more discipline areas, and original hypothesis-driven thesis research. Upon completion of the PhD, they pursue successful research careers at top academic institutions, in the biotech and pharmaceutical industries, and in other biomedicine-related career paths.

For more information: <http://www.med.upenn.edu/camb/>

Cancer Biology

The Program in Cancer Biology provides students an opportunity to undertake concentrated study of the basic biological processes that underlie the control of cell growth and metabolism, and how such processes are disrupted during the initiation and progression of cancer. The program stresses the importance of fundamental genetic and molecular pathways regulating cell proliferation, differentiation, movement, and survival. Program faculty conduct research in oncogenesis, tumor suppressor genes, cell cycle control, apoptosis, tumor virology, angiogenesis, cell migration/metastasis, and cancer immunology, cancer genetics and epidemiology. Students present in a research-in-progress seminar series and attend participate in the Abramson Family Cancer Research Institute seminar series.

For more information: <https://www.med.upenn.edu/camb/cb.shtml>

View the University's Academic Requirements for PhD Degrees (<http://catalog.upenn.edu/pennbook/academic-rules-phd>).

Required Courses

Code	Title	Course Units
Coursework		
BIOM 555	Regulation of the Genome	
BIOM 600	Cell Biology	
BIOM 611	Statistics in Experimental Design and Analysis ¹	
CAMB 512	Cancer Biology and Genetics	
CAMB 605	CAMB First Year Seminar	
Select two Cancer Biology program courses		
Select two electives		
Research		
CAMB 699	Lab Rotation	
CAMB 899	Pre-dissertation Research	
CAMB 995	Dissertation	

¹ Or other statistics course with approval of the Graduate Group.

The degree and major requirements displayed are intended as a guide for students entering in the Fall of 2018 and later. Students should consult with their academic program regarding final certifications and requirements for graduation.

Sample Plan of Study

Code	Title	Course Units
Year 1		
<i>Fall</i>		
BIOM 600	Cell Biology	
CAMB 512	Cancer Biology and Genetics	
CAMB 605	CAMB First Year Seminar	
CAMB 699	Lab Rotation	
<i>Spring</i>		
BIOM 555	Regulation of the Genome	
BIOM 611	Statistics in Experimental Design and Analysis	
CAMB 512	Cancer Biology and Genetics	
CAMB 699	Lab Rotation	
CAMB 699	Lab Rotation	
<i>Summer</i>		
CAMB 899	Pre-dissertation Research	
Year 2		
<i>Fall</i>		
CAMB 899	Pre-dissertation Research	
CAMB 530	The Cell Cycle, Genome Integrity and Cancer	
	or CAMB 704 Stress Responses in Metabolism and Cancer	
Elective		
<i>Spring</i>		
CAMB 899	Pre-dissertation Research	

CAMB 632 Cell Control by Signal Transduction
Pathways
or CAMB 701 Tumor Microenvironment

Elective

Year 3 and Beyond

CAMB 995 Dissertation