

CANCER BIOLOGY (PH.D.)

Historically, researchers involved in cancer biology research have focused on a particular field in biology or medicine relating to alterations in fundamental biological processes that result in malignancy, progression to fatal metastatic disease, or success or failure of therapy. However, continued advances in cancer diagnosis and treatment require scientists to have a greater specialization in the biology of cancer while, at the same time, exposure to a host of disciplines, ranging from biochemistry to cell biology and immunology, and to state-of-the-art cell biology and molecular biology methods. The Cancer Biology Graduate Program at the Wayne State University School of Medicine and the Barbara Ann Karmanos Cancer Institute is dedicated to providing an outstanding training experience in the rapidly evolving field of cancer research. Our philosophy is that to train the next generation of cancer researchers requires a strong interdisciplinary graduate curriculum with a major focus on the biology of cancer, and opportunities to regularly interact with clinicians engaged in cancer diagnosis and treatment. The goal is to develop scientists with capacities for critical scientific thinking needed to conduct original research as independent cancer investigators. The Ph.D. program consists of formal course work which provides a comprehensive education in the basic concepts, along with solid training in the core disciplines, that serves contemporary cancer research. Graduates gain a broad understanding of the fundamental principles that underlie this diverse and dynamic field with in-depth knowledge in their dissertation discipline. An integral part of the training experience involves opportunities to develop written and oral communication skills essential to future success as a cancer researcher.

Admission Requirements

Admission to this program is contingent upon admission to the Graduate School (<http://bulletins.wayne.edu/graduate/general-information/admission/>) and the graduate programs in the School of Medicine (<http://bulletins.wayne.edu/graduate/school-medicine/programs/>). Applicants to this program should have a background in one of the chemical or biological sciences; applicants with other backgrounds will be considered for admission depending on their competence related to specific areas of interest within the program. Admission is based on previous academic accomplishments, as documented by a transcript of a degree-in-progress or a posted official transcript of a completed degree. A minimum 3.0 grade point average is required although students typically have averages well in excess of this minimum. A statement of purpose, three letters of recommendation and a personal interview are required for admission. Applicants with previous research experience are strongly encouraged to apply. A description of their previous research experience should be provided. International students must be proficient in English, as determined by satisfactory performance on the English proficiency examination. Applicants should consult the Graduate School's website for details on demonstrating English proficiency (<https://gradschool.wayne.edu/admissions/english-proficiency/>).

Curriculum: All students in the Cancer Biology Graduate Program will enroll in the standardized Cancer Biology curriculum as summarized below:

Code	Title	Credits
Required Courses and Research		
CB 7130	Clinical Aspects of Cancer Biology	1
CB 7210	Fundamentals of Cancer Biology	4
CB 7220	Molecular Biology of Cancer Development	4
CB 7240	Molecular Mechanisms of Cancer and Therapy	4
CB 7300	Special Topics in Cancer Biology	1-5
CB 7430	Cancer Epidemiology	2

CB 7600	Applied Cancer Biostatistics	2
CB 7700	Recent Developments in Cancer Biology (6 req.)	4
CB 7710	Individual Studies in Cancer Biology (rotation (3 req.))	1-3
CB 7800	Rigor and Reproducibility in Cancer Biology	1
CB 7890	Seminar in Cancer Biology (6 req.)	4
CB 7996	Research	1-7
CB 8910	Applied Cancer Bioinformatics	1
CB 8920	Principles of Translational and Clinical Cancer Research	1
Total Credits		31-43

For M.D./Ph.D. students, up to 20 credit hours will be transferred from the medical school curriculum. In addition, M.D./Ph.D. students will be expected to enroll in 2 of the 3 Cancer Biology Core Curriculum Courses (CB 7210, CB 7220 and/or CB 7240) for a total of 8 credit hours and will select from two CB 7300 Special Topics courses.

During the second year of study, students submit a "Plan of Work" which documents the academic curriculum leading to the Ph.D. The didactic course work will be completed during the first and second years of Ph.D. study. A written comprehensive qualifying exam is administered in the late spring of the first year of study, followed by an oral comprehensive exam of the proposed dissertation research in the spring of the second year. Ph.D. candidacy is conferred upon successful completion of the oral comprehensive exam. During the summer of the first year, a month-long clinical rotation is required (CB 7130) during which graduate students' "round" with oncologists treating cancer patients in the Karmanos Cancer Hospital. The third and subsequent years are primarily devoted to dissertation research. Students will complete up to twenty-five research credits (including eighteen of dissertation research) during consecutive semesters in year three of study. This will complete the Graduate School requirements for the Ph.D. degree.

Dissertation Research

An applicant for the Doctor of Philosophy degree must satisfactorily complete at least sixty credits, including eighteen dissertation research credits in CB 9991 and CB 9992 for 9 credit hours each during consecutive semesters. All course work must be completed in accordance with the requirements of the Graduate School (<http://bulletins.wayne.edu/graduate/general-information/academic-regulations/>) and the School of Medicine (<http://bulletins.wayne.edu/graduate/school-medicine/programs/>) governing graduate scholarship and degrees.

To receive the Ph.D., students must successfully defend their dissertation research and complete a publishable research project under the guidance of a faculty mentor. In addition to traditional classroom learning, there are many additional educational opportunities available to our students including seminars by nationally/internationally renowned scientists both within and outside the cancer center, special non-credit courses, fellowship and grant writing and research workshops and scientific conferences.

RESEARCH: Outside of the required coursework and written and oral comprehensive exams, the bulk of Ph.D. study involves independent laboratory or population-based research leading to results of publishable caliber. The Cancer Biology Graduate Program offers research opportunities with outstanding faculty in many areas of contemporary cancer biology including cancer therapeutics, cancer metastasis, tumor microenvironment, breast cancer biology, carcinogenesis, cancer genetics, population studies, and cancer immunology. Students must complete three research rotations under the guidance of Cancer Biology

faculty during the first year of Ph.D. study (typically two in the fall and one in the winter semester), after which they choose their dissertation mentor. Dissertation research mentors are selected based on students' research interests and their research rotation experiences. Since scientific research is open-ended, the amount of time required for completion of a defensible dissertation leading to the Ph.D. cannot be predicted, although typically the Ph.D. degree is conferred within four to five years. A written dissertation and a final oral defense of the dissertation research to the Dissertation Research Committee are requirements for conferring the Ph.D. degree in Cancer Biology. There is an additional requirement of two research publications (one as first author) based on the dissertation research for receipt of the Ph.D. degree.

FINANCIAL SUPPORT: All students accepted into the program are provided with financial assistance; a specific application is not necessary. Students receiving assistantships are permitted to enroll in ten credit hours per Fall and Winter semester, and one credit hour during the Spring/Summer semester. Financial support for the training program in Cancer Biology is derived from university fellowships, traineeships supported by training grants from the National Cancer Institute, faculty grants, and individual graduate fellowships.