CANCER STUDIES, GRADUATE CERTIFICATE

Credential: Graduate Certificate
Field of Study: Cancer Studies

Program Overview

The Cancer Studies Graduate Certificate Program is a two-year training program for post-baccalaureate students to prepare them for successful matriculation into a PhD or MD/PhD program in biomedical science, data science, population health, public health, or a health profession focused on the research and treatment of cancer. Eligibility for the program requires students first be appointed to the American Cancer Society Post-Baccalaureate Program at the Case Comprehensive Cancer Center. The Certificate Program builds core competencies needed for success in cancer-intensive PhD or MD/PhD training programs, including foundational cell, molecular, and cancer biology; written and oral communication; clinical experiences; and networking. The Certificate Program consists of 15 credits of required and elective courses over two academic years, as well as laboratory training and mentored research, career development training, communication and application coaching, and career development networking.

Learning Outcomes

- Students will learn to self-evaluate their strengths and weaknesses, receive and use constructive evaluations from others, set professional goals, and seek training to achieve those goals through development and re-evaluation of Individual Development Plans with the steering committee and mentors.
- Students will learn to responsibly develop, implement, lead, and evaluate cancer-focused research projects that are rigorous and reproducible. Students will actively participate in project design, time management, project management, and data analysis while developing a research program with their laboratory mentors.
- Students will learn the foundations of cell and molecular biology and their application to cancer biology through completed coursework that is required of CWRU graduate students.
- Students will learn how to access and review current literature to facilitate project development and data interpretation.
- Students will learn preparation techniques to aid in the success of standardized testing and interviewing through preparatory courses and coaching.
- Students will learn the breadth and depth of cancer biology and research through participating in the Case CCC seminar series, and annual retreats.
- Students will learn the concepts and application of clear and simple communication through coursework, coaching, and opportunities for written and oral communication.
- Students will learn how to build their professional network and take ownership of their career development through attendance and participation in national and international conferences as well as Case CCC seminar series and annual retreats.

Graduate Policies

For graduate policies and procedures, please review the School of Graduate Studies section of the General Bulletin.

Program Requirements

The Case Comprehensive Cancer Center's ACS graduate certificate program consists of 16 credits of required and elective courses over two academic years, as well as a number of longitudinal training activities. The Program Administrator will track student progress and successful completion of requirements will be reviewed by the Steering Committee prior to conferring the Certificate. The Program Administrator will review program progress of each Scholar monthly and alert the Steering Committee to any concerns, so they may work with the students to ensure successful completion of requirements prior to the end of the program.

Requirements to earn the Certificate in Cancer Studies include:

- A final cumulative GPA of 3.0 or better for coursework
- Completion and revision of the Scholar IDP
- Completion of Rotations and Mentored Research (as measured by at least 30 hr/week research activity in the mentor's laboratory)
- 75% or better attendance at required longitudinal activities (monthly meetings, seminars, Case CCC retreats)
- Participation at least once as a reviewer in the Trainee Dream Experiment Award Competition
- Travel to at least one national conference
- A written report of their project summarizing their laboratory notebooks
- A final presentation of their research at the end-of-program symposium

Code	Title	Credit Hours
Required Courses:		
IBMS 450	Fundamental Biostatistics to Enhance Research Rigor & Reproducibility	1
IBMS 453	Cell Biology I	3
IBMS 455	Molecular Biology I	3
IBMS 500	On Being a Professional Scientist: The Responsible Conduct of Research	1
PHRM 520	The Cellular and Molecular Hallmarks of Cancer	3
PHRM 526	Grant Writing Tutorial	2
Elective		3
Total Credit Hours		**16**

Code	Title	Credit Hours
Potential Elective Courses:		
BIOC 434	Structural and Computational Biology	3
BIOC 445	Metabolic Regulation, Dysregulation, and Disease	3
BIOC 453	Biochemical Pathways in Cancer Therapeutics	3
BIOC 460	Advanced Technologies for Cancer Research	3
PHRM 409	Principles of Pharmacology	3
PQHS 411	Introduction to Health Behavior	3
PQHS 416	AI in Medicine: Knowledge Representation and Deep Learning	3
PQHS 440	Introduction to Population Health	3

PQHS 451	A Data-Driven Introduction to Genomics and Human Health	3

Individual Development Plans. The ACS Post-Bacc Steering Committee will work with each enrolled Scholar to develop an initial Individual Development Plan (IDP). The formation, implementation, and revision of the IDP requires a series of iterative and interactive steps to be conducted by the Scholar and the Steering Committee. The IDP is prepared by the Scholar, highlighting research goals and needs and will be discussed with the Steering Committee to establish anticipated outcomes, monitoring plans, and evaluation. The initial IDP will be revisited and revised as necessary with the Scholar's research mentor and with the Steering Committee every 6 months.

Laboratory Training, Rotations, and Mentored Research. During their first week (prior to the start of the fall semester), Scholars will attend technology-specific lectures and tour the 13 Case CCC Shared Resources. They will also complete in-person safety training with CWRU Environmental Health and Safety prior to entering a lab and receive on-going lab-specific safety training. Annual retraining is required. To decide which cancer focus and environment is most beneficial to their career development, Scholars will rotate in two of the program mentors' labs for two-weeks each. A third rotation is possible, if needed. Once Scholars choose a primary mentor, they will revise their IDPs with the help of the mentor. From this point onward, Scholars will conduct intensive mentored cancer research with their primary mentor. Scholars will be integral to the development of their projects, working with their mentors to provide input, where possible, rather than simply being assigned a set of experiments. Having a voice in project development is critical to developing a deep understanding of the project. Scholars will meet with their primary mentor at least weekly, attend lab functions (meetings, journal clubs), maintain a lab notebook, and function as a graduate student, including attending seminars and other student functions.

Longitudinal training. Scholars will receive extensive career development training from their mentors, labs, and the Steering Committee. In addition, Scholars will participate in a monthly program meeting with Steering Committee members. Scholars will report on their progress, present journal articles, practice local and national presentations, and have opportunities to engage in discussions with UR faculty from the Case CCC and its partners Cleveland Clinic and University Hospitals of Cleveland where they will share their own career development stories. Scholars will also attend weekly Department or Case CCC Seminars to learn from nationally renowned invited experts. For Case CCC seminars, Scholars will be invited to attend trainee lunch sessions with national speakers to learn about career development and build their professional network. In addition, Scholars will attend three annual cancer-specific forums offered by the Case CCC: Disparities Conference in March, the Bench to Bedside Retreat in June, and Annual Scientific Retreat in July. Trainees at all levels are active participants in the retreats, which expose them to the workings of a large Comprehensive Cancer Center and stimulates interactions with colleagues in diverse areas of cancer research. Trainees present short-talks and posters and attend a lunch session with retreat keynote speakers to discuss career trajectories. They also attend career enrichment seminars with varied topics such as the preparation of fellowship applications. In addition, Scholars will shadow physician-scientists to expose them to the clinical care of cancer patients.

Communication and Application Coaching. Scholars will build communication skills through lab journal clubs, seminar presentations, and the grant writing course mentioned above. In addition, Scholars will serve as reviewers for the Trainee Dream Experiment Award Competition, in which the Case CCC convenes an NIH-style study section consisting of experienced faculty and trainees to review applications. This is a valuable experience for trainees to learn about the review process while functioning as a reviewer and this helps them improve their own grant applications. Our expectation is that Scholars will develop a keen sense of how to present ideas in the context of a formal grant and have a skillset for earning a funded fellowship soon after matriculating into a PhD or MD/PhD program. Scholars will also receive coaching for applying to graduate school and/or MD/PhD training programs. Mentors and the Steering Committee will provide assistance and feedback for personal statements and will conduct mock interviews. The Case CCC will provide funding for each Scholar to take the Kaplan preparatory courses, and we will conduct practice tests, assessments, and feedback. Directors of the CWRU BSTP and MSTP will also meet with Scholars to discuss successful application strategies.

Career Development Networking. Each year, Scholars will attend and present their research at a national conference such as the Annual Biomedical Research Conference for Minoritized Scientists or the American Association for Cancer Research, providing opportunities for networking and practicing presentation skills. All Scholars will be invited to join the CWRU SOM Minority Graduate Student Organization and Biomedical Graduate Student Organization, providing a voice in training at CWRU SOM and peer leadership opportunities.

Final Report and Presentation. Prior to the end of the second year of training, Scholars will be required to generate a 3-5 page summary of their research project and laboratory notebooks. The report will include a background and rationale for the project, significance and innovation of the project, the overall hypothesis that was tested, an explanation of methods used, a summary of the results obtained, and a conclusion. This laboratory notebook and project summary will be reviewed by the Scholar's Mentor and the Steering Committee. A final symposium/celebration will be conducted at the end of the program. Scholars will be required to provide a 20 minute presentation of their projects and future plans to their peers, program leadership and mentors, and members of the Case CCC. Scholars will also answer questions from the audience about their projects, training, and future plans.

Sample Plan of Study

During the week prior to the start of fall classes students will complete:

- Case CCC Bootcamp (tour of shared resources)
- EHS Safety Training
- Develop IDP with Steering Committee

First Year		
Fall		**Credit Hours**
IBMS 453	Cell Biology I	3
IBMS 455	Molecular Biology I	3
Laboratory Rotations (2-3 two-week rotations to select mentor)		
Mentored Research in Laboratory		
Monthly Program Meetings		
Seminar Series, Department or Case CCC		
Begin Fellowship Writing		
	Credit Hours	**6**

Spring		
IBMS 500	On Being a Professional Scientist: The Responsible Conduct of Research	1
PHRM 520	The Cellular and Molecular Hallmarks of Cancer	3
Mentored Research in Laboratory		
Monthly Program Meetings		
Seminar Series, Department or Case CCC		
Annual Disparities Conference		
Fellowship Writing		
Kaplan Preparatory Course		
	Credit Hours	**4**
Summer		
Mentored Research in Laboratory		
Monthly Program Meetings		
Case CCC Bench to Bedside Retreat		
Case CCC Annual Scientific Research Retreat		
Physician Shadowing		
Grad School Application Preparation		
	Credit Hours	**0**
Second Year		
Fall		
PHRM 526	Grant Writing Tutorial	2
IBMS 450	Fundamental Biostatistics to Enhance Research Rigor & Reproducibility	1
Elective [a]		3
Mentored Research in Laboratory		
Monthly Program Meetings		
Seminar Series, Department or Case CCC		
Finish Fellowship Writing		
Grad School Application		
	Credit Hours	**3**
Spring		
Elective [a]		3
Mentored Research in Laboratory		
Monthly Program Meetings		
Seminar Series, Department or Case CCC		
Annual Disparities Conference		
Grad School Interview Preparation		
Finish Grad School Application		
Final Report (notebook summary)		
Final Presentation at End of Program Symposium		
	Credit Hours	**3**
Summer		
Fellows that remain on campus may continue to participate in:		
Mentored Research in Laboratory		
Monthly Program Meetings		
Case CCC Bench to Bedside Retreat		
Case CCC Annual Scientific Research Retreat		
Physician Shadowing		
	Credit Hours	**0**
	Total Credit Hours	**16**

a Elective can be taken fall or spring of second year depending on course availability.