

CELLULAR AND MOLECULAR MEDICINE, PHD

The Graduate Training Program in Cellular and Molecular Medicine prepares scientists for laboratory research at the cellular and molecular level with a direct impact on the understanding, diagnosis, treatment, and prevention of human diseases. The Ph.D. graduates of the program obtain rigorous training in scientific research and develop a thorough knowledge of human biology and human diseases.

This program grew out of a need for graduate training at the interface between medicine and the traditional basic science disciplines. Rapid progress in cellular and molecular biology has strongly impacted clinical medicine, offering insights about the fundamental causes of many diseases. Translational research—often described as “bench-to-bedside” studies—accelerates the discovery of new treatments directed at the basic mechanisms of disorder and disease. Thus, the goal of this program is to train scientists who will make discoveries in the laboratory that can be applied expeditiously to the diagnosis, treatment, and prevention of disease. New technology allows scientists to identify genetic and molecular defects causing or predisposing to disease. The trainees in this program are working precisely at this interface between science and medicine to contribute to the long-term well-being of society.

Facilities

Students will work in well-equipped laboratories of approximately 140 program faculty located throughout the medical school campus. These researchers are supported by many shared facilities including microscopy, molecular biology, and protein chemistry.

Financial Aid

The program is supported by a combination of monies from the Lucille P. Markey Charitable Trust and an NIH training grant. Each student is provided a stipend, health and dental insurance, and tuition throughout their years in the program. The program covers these benefits during the students' first year; in subsequent years, the research advisor is responsible.

Admission Requirements

The mission of the CMM program is to recruit and train outstanding PhD candidates in translational research. We use a holistic approach in evaluating applicants, to ensure the best fit between our training program and trainees. Evidence of prior research experience is paramount in the admissions process, along with letters from research mentors. A bachelor's degree from a qualified college or university is required. Applicants are expected to have taken the following courses: biology, inorganic chemistry, organic chemistry, physical chemistry, physics, and calculus. Cell biology and/or biochemistry is recommended. Passage of the TOEFL is required for all students whose undergraduate instruction was conducted in a language other than English. CMM does not require or review GRE scores in the admissions process.

CMM draws from the top of an extremely strong and deep pool of candidates. Although we do not use score cut-offs, the average accepted student has a GPA of 3.71. Our class size varies between 20-24, and includes in addition to PhD candidates, trainees in dual MD/PhD, DVM/PhD programs and Clinical Fellows. Yield on admissions offers is high,

ranging from 45-69%, with an average of 55% of offers resulting in acceptance.

The Vivian Thomas Scholars Initiative (VTSI) is dedicated to nurturing, mentoring and connecting the exceptional diverse talent that exists at historically black colleges and universities (HBCUs) and other minority serving institutions. (MSIs) to STEM graduate education and future leadership in STEM careers. The application for VTSI and the supplemental questions are found within the School of Medicine application for those interested in applying.

GEM (The National Consortium for Graduate Degrees for Minorities in Engineering and Science) award fellowships to eligible students who pursue graduate education in science or engineering. For more information, please visit GEM Fellowship webpage (<https://www.gemfellowship.org/gem-fellowship-program/>). Prospective fellows apply to GEM and the sponsoring institutions at the same time. Potential candidates must indicate on the JHU application that they have received or are being considered for a GEM Fellowship.

Inquiries regarding admissions should be referred to:

Office of the Graduate Program in Cellular and Molecular Medicine
1830 E. Monument Street, Suite 2-103
Telephone: (410) 614-0391; (410) 614-3640

For questions not addressed on these pages, please email cmm@jhmi.edu.

Program Requirements

Students must complete successfully the following courses:

Code	Title	Credits
ME.800.702	Introduction to Cellular and Molecular Medicine	5
ME.800.718	Topics in Cellular and Molecular Medicine	1
ME.800.801	Cellular and Molecular Medicine Research	1 - 18
ME.800.703	CMM Core Discussion	1.5
ME.110.733	Principles of Genetics	2
ME.260.709	Molecular Biology and Genomics	1.5
ME.360.728	Pathways and Regulation	2
ME.110.728	Cell Structure and Dynamics	1.5
ME.800.709	Cellular and Molecular Basis of Disease	3
ME.800.724	Introduction to Clinical Research	1.5
ME.800.717	Grant Writing: Nuts and Bolts	1.5
ME.800.789	3B?s: Bench to Bedside and Back	1
PH.260.801	Topics in Immunology I	1
PH.260.611	Principles of Immunology I	4

Students are required to take four electives to further broaden their experience in cellular and molecular medicine during the duration of their studies. Mandatory one elective out of the four required must be a **Biostatistics** course. Rigor and Reproducibility in Research (3R's) principles are integrated throughout the program's coursework. The Responsible Conduct of Research (RCR) ethics training taken in year one fulfills a graduation requirement. An Ethics refresher course includes attending several Research Integrity Colloquium lectures each year.

Students are expected to perform research rotations in at least three different laboratories culminating with the selection of a thesis advisor to

begin original research leading to their doctoral dissertation. All rotations must be performed in the laboratories of CMM faculty members.

Additionally, the program requires students to actively participate in the **OPTIONS Career Curriculum**, managed by the Professional Development and Career Office, that provides protected time for students to develop their career goals and prepare for their future. Through interactive workshops, students discover careers of interest, develop career-specific skills and build a professional network while connecting with fellow trainees with similar interests.

A University-mandated Doctor of Philosophy Board Oral Examination must be completed by the end of the second year of study. Annual thesis committee meetings are held until such time as the thesis committee believes the student is ready to write their doctoral dissertation. The dissertation is based on the student's novel research; a public seminar of thesis work is a graduation requirement.