CELLULAR AND MOLECULAR PHYSIOLOGY, PHD

Researchers in Physiology, Pharmacology & Therapeutics integrate many disciplines to understand the functions of individual systems within a whole organism and the mechanisms that produce and sustain life. Faculty address issues such as the molecular control of cell membrane activities, intercellular and intracellular communication, coordinated cell signaling for organ development, and mammalian embryonic development. They use computational methods, genetics, and post-genomic strategies to study these issues in a variety of organisms, from bacteria and yeast to zebrafish, mice, and humans. Faculty participate in a number of graduate programs, including the Cellular and Molecular Physiology Graduate Program.

Why the Cellular and Molecular Physiology Graduate Program?

Every modern branch of biomedical research has its physiological roots.

The Cellular and Molecular Physiology Graduate Program has a long-standing tradition of excellence. Our faculty, trainees, and staff seek to understand how the human body works from head to toe. Together, we exploit the range of available model systems to understand physiological processes at a mechanistic and integrated level in health, with the explicit goal of understanding human disease and identifying potential therapeutics.

Postdoctoral Training

Students who have already been awarded the Ph.D. or M.D. degree may be accepted for postdoctoral research work with members of the faculty.

Admission Requirements

December 8 is the deadline for the receipt of ALL application materials for August admission into the CMP graduate program.

At the time of entry into the program, applicants must have completed a bachelor's or higher degree. Ordinarily this degree will be in biology, physics, chemistry, mathematics, or engineering, or some combination of these, but exceptions will be made. Scientific research experience is not required but is now common among applicants to our program. Such experience is to your advantage and is widely available to undergraduates willing to take the initiative. If you are planning ahead, consider searching out an experience of this kind.

Regardless of the degree major, the following are entrance requirements: Physics: one year college level course is required; two years of study are recommended. Chemistry: two years are required, and three recommended, of college level courses with laboratory, including inorganic, organic, and physical chemistry. Biology: two years of college level courses, with laboratory. Mathematics: through differential and integral calculus.

Foreign applicants must take the Test of English as a Foreign Language Exam (TOEFL).

In addition to the above, official transcripts or certified records from all university (undergraduate and graduate) study and three letters of recommendation from at least two faculty members who are acquainted with the applicant's academic work are required to complete the application for admission. While these requirements will apply for the large majority of applicants, exceptions will be made for unusually well-qualified candidates.

Applications are due by December 8th for August admission. A full application should be completed online. ETS Institutional code: 5316 for TOEFL scores.

The requirements for the application are as follows: (removed detailed information on what these items are)

- Completed Online Application
- Curriculum Vitae
- Statement of Interest and Career Objectives
- Undergraduate Transcripts
- Three (3) Letters of Recommendation
- Application Fee

NOTE: GRE scores are no longer required and if submitted, will not be used in our decision-making process!

How to Apply

To ensure that all required documents are properly submitted, closely follow the directions found at Graduate Program Application Instructions (https://www.hopkinsmedicine.org/som/education-programs/graduate-programs/admissions/on-campus-programs/).

For more information, please visit our Graduate Admissions (https://www.hopkinsmedicine.org/som/education-programs/graduate-programs/admissions/) page.

When applying for our program you can also apply for up to **four** PhD programs in JHU-SOM and pay for only **one** application fee.

Program Requirements

First Year

The first year curriculum, capped by the program's own Organ Physiology course, is comprehensive in scope and provides each student with an incredible foundation of scientific knowledge. Through three 10-week rotations, students select a lab to perform their dissertation research working in a field that excites their curiosity and in an environment that is both nurturing and challenging.

From start to finish, students' communication skills are continuously honed through regular presentations to the department. Every trainee is encouraged to apply for fellowships and awards, and other career building opportunities.

Courses

Students must successfully complete the following basic science courses:

Code	Title	Credits
ME.100.716	Analysis of Macromolecules	2
ME.260.709	Molecular Biology and Genomics	1.5
ME.110.733	Principles of Genetics	2
ME.360.728	Pathways and Regulation	2
ME.110.728	Cell Structure and Dynamics	1.5
ME.360.720	Organ Systems-Physiology	6
ME.360.800	Physiology Research [1]	1 - 18

ME.330.708	Primary Source Readings and Analysis [2]	0.5
ME.360.801	Physiology, Pharmacology & Therapeutics Seminar Series [2]	1
ME.800.811	Introduction to Responsible Conduct of Research	1

[1] Complete each semester and summer term.
[2] Complete in the fall and spring of the first year.

Rotations

During their first year, students participate in three laboratory rotations (September - Beginning of June) so that they select a thesis lab. First year students will provide 2-3 page write-ups from their 1st and 3rd rotations. The 2nd rotation will be a presentation given at a Research in Progress Seminar, as scheduled by the program.

Additional Requirements for All students

Research in Progress Seminars - Presenters are 1st to 4th year graduate students within the Department of Physiology, Pharmacology & Therapeutics. First-year students will give a presentation based on their work during their 2nd lab rotation.

Faculty Seminars - Speakers are invited faculty. Mandatory attendance for luncheons with faculty for 1st year CMP students. Attendance at seminars is mandatory and attendance is taken.

Retreat - A department Retreat is held August/September of each year. Attendance is required of all students.

Second Year and Above

Electives

Four electives must be completed as a part of the degree requirements by the end of year 5. The selection of these courses is influenced by a student's dissertation project and made in consultation with their mentor. One elective credit is 12-24 classroom hours and must be approved by the Program Director. Courses must be germane to the student's studies in physiology, as determined by the Program Director. Up to one required elective can be satisfied by a course taken outside of Johns Hopkins. For a course to satisfy an elective requirement it must be relevant to the student's course of study, of high educational quality and substantive in terms of effort (such as summer courses offered by MBL and CSHL; approved on-line courses). Credit will be granted if a student receives a grade of B- or higher or a Pass. Also, two of the four elective requirements may be satisfied for those students who earned a Master's degree prior to matriculating into CMP. This decision is at the discretion of the Program Director and will be based on whether such prior coursework met CMP standards for an elective, the subject matter, and the final grade.

Thesis Proposal & Committee

The first thesis meeting should take place as soon as practical after successfully completing your Oral Exam and required courses, but not later than August 15th at the end of the second year. A thesis proposal, typically in the format of an NIH fellowship application, is prepared for the first meeting of a student's thesis committee. Thesis meetings are to occur yearly or more frequently, if needed. A Thesis Committee Meeting form is completed on the Thesis Tracker. Also, the student shares an action plan with their thesis committee.

The thesis committee consists of the advisor and a minimum of three additional faculty (typically full-time Johns Hopkins faculty that are assistant professors or above; faculty at other institutions may be also considered although this could complicate scheduling thesis meetings) who are knowledgeable in the relevant field of study and whose expertise may be beneficial to the student's project. There are no other restrictions on the composition of the committee, but it must be approved by the student's advisor.

Annual Academic and Professional Development Mentor-Mentee Meetings

Johns Hopkins University requires all PhD programs to have a policy in place for an annual discussion between each PhD student and their advisor(s) that covers the student's academic progress and professional development goals. This is also known as an Individual Development Plan or IDP. Student and advisor complete separate IDP forms. The form includes questions on the student's research project and progress, their professional development, the mentoring relationship with the advisor, the overall lab/research team environment, and an evaluation of competencies.

Graduate Board Oral Examination

Each student must pass an oral qualifying exam, which must occur by the end of March of the second year in the program. The goals of the exam are to test the depth and breadth of knowledge as covered in the first-year coursework and to examine the student's ability to design and interpret experiments.

Doctoral Dissertation

Usually in year four or five, the student's thesis committee agrees that the student is nearing completion of their research. When a student receives a "final phase" check at the thesis committee meeting, they are expected to complete any remaining experiments, write their thesis, and get approval from their mentor and reader (another faculty member from the thesis committee) within 6 months. Following completion of the dissertation, the student will present their work at an open seminar. Typically, the student's research is published in one or more scholarly journals prior to the dissertation being written.

Mission Statement

To develop agile, independent scientists who identify important scientific gaps, establish creative, mechanistic hypotheses, and execute experimental strategies that are comprehensive, cutting edge, and push their field forward.

Learning Objectives

Upon successful completion of the PhD in Cellular and Molecular Physiology, students will have mastered the following competencies:

- Demonstrate a deep understanding of core concepts within physiology at a cellular and molecular resolution
- Accurately analyze and apply scientific knowledge to answer questions within their research discipline
- Identify and formulate critical questions and innovative approaches to advance their scientific field
- Analyze and interpret data with responsibility and integrity
- Explain and present complex scientific concepts clearly and effectively in written and oral forms
- Develop a career action plan
- Appraise and evaluate their own skills and professional interests
- Contribute to the scientific community and society at large