Cellular and Molecular Pathology Graduate Training Program
University of Pittsburgh School of Medicine

The Cellular and Molecular Pathology Graduate Training program at the University of Pittsburgh School of Medicine includes the active participation of both basic research scientists and clinicians to provide insight and exposure to the clinical aspect of biomedical research. The program is dedicated to the development of each student as an independent biomedical research scientist.

All incoming graduate students to the School of Medicine are enrolled in the Interdisciplinary Graduate Training Program (INTBP) for the first year and participate in the same core courses. The INTBP is comprised of nine PhD granting training programs and approximately 200 training faculty. At the end of the first year, students enter a particular laboratory for their thesis research and a graduate training program. The Interdisciplinary Biomedical Graduate Program curriculum emphasizes research experience and practical skills from the first day. The approach is flexible, and accommodates students whose research interests are still evolving by introducing them to a variety of fields through interdisciplinary courses and laboratory experiences. For those students who have a clearly defined research interest, the program offers the opportunity to move quickly into a dissertation project and accelerate their study.

The first year core courses include three research rotations, Foundations of Biomedical Science, Statistics, and Research Ethics courses. The research rotations are selected by students to meet their research interests. These research rotations provide an opportunity to experience individual laboratory environments, including the techniques being used in the laboratory and the research questions being addressed. The Foundations of Biomedical Science is the first course taken by all students. The course is designed to convey knowledge of the molecular mechanisms controlling cell and tissue function and to develop an understanding of the experimental evidence supporting these concepts. The conceptual breadth of modern biomedical science is covered through a longitudinally integrated presentation of material drawn from biochemistry, cell biology, genetics, immunology, microbiology, neurobiology, pathology, pharmacology and physiology. The development of critical thinking skills is emphasized through an evaluation of experimental evidence and reading of the primary literature. Contemporary approaches to problem-solving in biology as well as principles underlying modern methods of biomedical research are integrated through the analysis of mechanisms underlying biological phenomena. During the summer of the first year all students take courses in statistics and scientific ethics and increasingly specialized coursework in the program the student has chosen.

Within the Cellular and Molecular Pathology Graduate Training Program, students are required to take three additional courses. The first course is Molecular Mechanisms of Tissue Growth and Differentiation and is typically taken during the Spring term of the first year. Students are required to take the Pathology Research Seminar course starting in the Fall term of the second year of graduate school. Pathology graduate students are also required to complete one of the following two courses: Cancer Biology and
Therapeutics, or Molecular Pathobiology. This course is typically taken during the Fall term of the second year of study. Course descriptions for each of these offerings are listed below. The goal of the course requirements is to teach students the basic mechanisms of how cells and tissues normally develop, and then to discover the mechanisms of what goes awry during different disease states. Students are also taught how to critically evaluate research data and to properly design and execute experiments to address a particular research topic.

COURSE DESCRIPTIONS:

**MSCMP 2750 Research Seminar** (01.0 Cr)
Students present their research or a recent research article from a broad range of topics selected by the student in consultation with a faculty advisor. The course meets weekly during which the student presents his/her research in progress or an article of his/her choice. Emphasis is placed on a careful analysis and critical evaluation of the manuscript as well as the development of teaching and speaking skills needed for scientific presentation. The student is expected to elucidate issues relevant to the topic and to answer questions from other graduate students and faculty. Each student is evaluated by both the faculty and the students that attend the conference.

**MSCMP 2730 Molecular Mechanisms of Tissue Growth and Differentiation** (03.0 Cr)
This course covers the anatomy, embryology, histology, function, and growth regulation (growth factors, receptors, and signaling pathways) of various differentiated tissues. Multidisciplinary lectures are given by faculty that have ongoing research in these areas. The course is designed to offer detailed information on specific tissues, tissue-tissue interactions, and overlapping cellular and molecular pathways that exist in multiple tissues.

**MSCMP 3710 Cancer Biology and Therapeutics** (03.0 Cr)
This presents biochemical and clinical aspects of cancer biology and therapy and is designed for graduate students in basic sciences or medicine. The lectures will cover: Biology of Normal and Neoplastic Cells, Mechanisms of Neoplastic Transformation, Chemical and Environmental Carcinogenesis, Viral Oncogenesis, Breast and Prostate Cancer, Chemotherapy, Radiotherapy, Gene Therapy, Tumor Immunology, and Nutrition and Cancer.

**MSCMP 2740 Molecular Pathobiology** (03.0 Cr)
This course is comprised of five disease modules that change designed to introduce students to the integration between basic and clinical research on the molecular pathogenesis of relevant human diseases. The course will provide students with an overview of the natural history of selected diseases, their diagnosis and clinical management. This will be followed by in-depth discussions concerning the pathologic substrate of the disease, with particular attention focused on the molecular mechanisms of disease progression. In addition to current basic science research, students will be
exposed to the clinical impact of basic science discoveries upon the development of new therapeutic interventions. Discussions of current research trends and factors that enhance fundability of research projects will ensue. Each disease module will contain lectures from the faculty followed by presentations of current research papers by the students. These research presentations/discussions will be peer reviewed by fellow students and the faculty, and form the basis of the final grade.

Elective courses offered by the Cellular and Molecular Pathology graduate training program include Stem Cell Biology, Angiogenesis, Cellular and Molecular Mechanisms of Neurodegeneration, and Topics in Experimental Neuropathology. Further information about these courses and the graduate program can be found at the following website: http://path.upmc.edu/cmp/00.htm