The purpose of this course is to give an introduction to the physiology of the major human organ systems, as well as selected associated pathophysiology. The course will provide a physiological basis for subsequent study and research in Molecular Medicine. The integration of clinical faculty into the course will emphasize the importance of bringing scientific knowledge to bear on clinical problems, a theme which will be stressed throughout the Molecular Medicine curriculum. The course will also acquaint students with medical terminology.

MMED 412. Metabolism. 2 Units.

The course will include a combination of interactive lectures, research presentations, related journal club article, and group projects with presentations. Topics to be covered include: bioenergetics/oxidative phosphorylation, carbohydrate metabolism; lipid and lipoprotein metabolism, amino acid and nucleotide metabolism.
Molecular Medicine (MMED)

MMED 521. Molecular aspects of the diagnosis, pathology, and treatment of selected human diseases. 3 Units.
The goal of this course is to integrate medical knowledge into PhD training. This team-taught seminar course focuses on a top down examination of selected human diseases starting with clinical presentations of the manifestations, diagnoses, and treatment of disease. This is followed by study of the pathology, cell biology, and molecular biology of the disease. This information forms the foundation of a final discussion of current treatment strategies and ongoing research to identify new strategies. One to two separate disease areas will be discussed during each semester, such as diabetes, colon cancer, and heart failure. The specific areas of discussion are selected to demonstrate the strength of an integrated team of clinical and basic scientists; and to provide a model for students to follow in future studies in their own area of expertise. Emphasis will be given to the basic scientific observations that formed the basis of successful clinical practice, and how this was utilized by integrated teams of basic and clinical investigators to provide better patient care. Students will prepare for discussions with close reading of the literature. Faculty will present an overview in a discussion format. It is anticipated that each disease area will be presented by an integrated team of clinical and basic scientists. The remainder of the sessions will be devoted to instruction in grant proposal writing and student preparation of a research grant proposal based upon their thesis research in advance of the student's qualifying exam. Grading will be based both upon preparation for and participation in discussions, and upon the research proposal. Recommended Preparation: Introductory Graduate or Medical School courses in Cell Biology, Molecular Biology, and Physiology.

MMED 522. Grant Proposal Writing. 2 Units.
The goal of this course is to learn about the NIH institutes and grant proposal review and administration, how to compose the various sections of an NIH style grant proposal, and to gain practice in grant proposal writing skills. The course includes weekly writing assignments covering the different sections of an NIH style grant proposal. Upon completion of the grant proposal, students engage in a mock study section to review each other’s proposals. Grading will be based on grant writing assignments and participation in the mock study section.

MMED 601. Dissertation Research. 1 - 9 Units.
Research leading toward the Ph.D. dissertation in Molecular Medicine.

MMED 612. Clinical Experience. 2 Units.
Each student will be assigned a Clinical Mentor who will co-advice the student and serve on both the Qualifying Examination Committee and Thesis Committee. The Clinical Mentor will develop an individualized curriculum for the student in consultation with the Thesis Research Mentor and Program Director. The curriculum will be organized around the integrated, multidisciplinary disease groups at the Clinic. The students will attend and actively participate in the regularly scheduled multidisciplinary clinical conference organized by their disease group (most meet for one hour every week or every other week), usually involving a combination of case presentations and research presentations. At the conclusion of the semester the student will make a presentation to the group focused on a relevant translational research problem. The Clinical Mentor will also organize a series of supervised clinical experiences (with a Mentor) to various locations where students will observe clinician interactions with patients to better understand the disease from the patient perspective and to disease-related diagnostic and research laboratories.

MMED 701. Dissertation Ph.D.. 1 - 9 Units.
Research leading toward the Ph.D. dissertation in Molecular Medicine. Recommended preparation: Advancement to candidacy in MMED. Prereq: Predoctoral research consent or advanced to Ph.D. candidacy milestone.