Prerequisite: Students will put together an integrative proposal to present to the class, disease or integrative model system affects various organ systems. Students will choose a disease/model system from a chosen list of diseases/model systems that affect multiple systems of the body. This course is designed to help students develop the ability to learn in a modular fashion, such that either semester may be taken independently. MPHY 616 is an introduction to methods used to acquire, extract, organize, analyze, store and interpret the major types of data of interest in systems biology. It will consist of two main units: (1) exploration, analysis and interpretation of experimental data and (2) bioinformatics.

MPHY 617 Nervous System I/Musculoskeletal System
Credits 2. 2 Lecture Hours.
This course is a separate module within the course MPHY 613.

MPHY 618 Cardiovascular System
Credits 3. 3 Lecture Hours.
This course is a separate module within the course MPHY 613.

MPHY 619 Nervous System II
Credit 1. 1 Lecture Hour.
This course is a separate module within the course MPHY 614.

MPHY 620 Gastrointestinal System
Credit 1. 1 Lecture Hour.
This course is a separate module within the course MPHY 614.

MPHY 621 Excretory System
Credit 1. 1 Lecture Hour.
This course is a separate module within the course MPHY 614.

MPHY 622 Endocrine System
Credit 1. 1 Lecture Hour.
This course is a separate module within the course MPHY 614.

MPHY 623 Respiratory System
Credit 1. 1 Lecture Hour.
This course is a separate module within the course MPHY 614.

MPHY 624 Biostatistics
Credits 2. 2 Lecture Hours.
Introduction to methods used to acquire, extract, organize, analyze, store and interpret the major types of data of interest in systems biology.

MPHY 625 Bioinformatics
Credits 2. 2 Lecture Hours.
Introduction to methods used to acquire, extract, organize, analyze, store and interpret the major types of data of interest in systems biology.

MPHY 631 Cardiovascular Science
Credits 4. 4 Lecture Hours.

MPHY 616 Computational Systems Biology
Credits 4. 4 Lecture Hours.
This course is designed as the first of a two-semester, multi-disciplinary graduate course targeted at students with an interest in computational aspects of systems biology. The course will be constructed in a modular fashion, such that either semester may be taken independently. MPHY 616 is an introduction to methods used to acquire, extract, organize, analyze, store and interpret the major types of data of interest in systems biology. It will consist of two main units: (1) exploration, analysis and interpretation of experimental data and (2) bioinformatics.

MPHY 616 is an introduction to methods used to acquire, extract, organize, analyze, store and interpret the major types of data of interest in systems biology.
MPHY 632 Cardiovascular Pathobiology  
Credits 4. 4 Lecture Hours.  
The Cardiovascular Pathobiology course is an exploration of the pathophysiology underlying cardiovascular diseases, including atherosclerosis, cardiomyopathies, heart failure, hypertension, congenital abnormalities and valvular disorders. The conceptual foundation is the tissue response to injury (inflammation) and the integrated reactions at the cellular, organ, system and whole organism levels initiated by a specific insult or disorder. Presentation and critique of journal articles in the cardiovascular field and development of research proposals are emphasized.  
Prerequisite: MPHY 631 or equivalent.

MPHY 633 Advanced Techniques in Cardiovascular Research  
Credits 1 to 4.  
This course emphasizes mastering of a specific technique used in modern cardiovascular research under the guidance of a faculty expert. Topics span intact animal to single cell techniques. Examples include animal models of human disease, advanced physiological imaging, mouse echocardiography, direct mouse intra-cardiac pressure-volume measurements, isolated intact papillary muscles, isolated microvessels/lymphatics, intracellular biosensors, induced pluripotent stem cells, patch clamping and flow cytometry.  
Prerequisites: Contact course coordinator for prerequisites and topic availability.

MPHY 634 The Lymphatic System  
Credits 3. 3 Lecture Hours.  
This course explores the myriad functions of the second circulation of the human body, the lymphatic system. Topics covered include lymphatic development; lymphangiogenesis; morphology and function of lymphatic capillaries, muscular lymphatics and lymph nodes; mechanisms of lymph formation and propulsion; intrinsic and extrinsic mechanisms of lymphatic pumping and flow regulation; role of the lymphatic system in inflammation and immunity; primary and secondary lymphatic disorders. Emphasis is on critique of the literature and self-directed integration of concepts and data into a research proposal.

MPHY 681 Seminar  
Credit 1. 1 Lecture Hour.  
Focus will be on critical scientific thinking. Emphasis placed on oral communications, scientific writing and grant preparation.  
Prerequisite: Approval of instructor.

MPHY 685 Directed Studies  
Credits 1 to 6. 1 to 6 Lecture Hours.  
Limited investigation in fields other than those chosen for thesis or dissertation.  
Prerequisite: Approval of instructor.

MPHY 689 Special Topics  
Credits 1 to 4. 1 to 4 Lecture Hours.  
Selected topics in an identified area of physiology and associated basic sciences. May be repeated for credit when topics vary.  
Prerequisite: Approval of instructor.

MPHY 691 Research Credit  
Credits 1 to 15. 1 to 15 Lab Hours.