

# PHYSIOLOGY (PHYL)

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## Courses

### **PHYL 3014. Research in Endocrinology of Aging. Credit Hours.**

The course consists of student participation in research on glucocorticoid-induced gene expression during aging and food restriction.

### **PHYL 3016. Ion Channel Research. Credit Hours.**

The course includes student participation in ongoing basic research on the molecular mechanisms of signaling pathways acting on ion channels. Techniques may include patch-clamp, electrophysiology, molecular biology and biochemistry.

### **PHYL 4000. Special Topic. 1-42 Credit Hours.**

This is a self-designed course created by both the student and the department to cover a specific topic. A Course Approval Form must be completed along with documentation of the designed course description.

### **PHYL 4012. Molecular Endocrinology Research. 4 Credit Hours.**

The course consists of student participation in research on glucocorticoid-induced gene expression during aging and food restriction.

### **PHYL 4016. Ion Channel Research. 4 Credit Hours.**

The course includes student participation in ongoing basic research on the molecular mechanisms of signaling pathways acting on ion channels. Techniques may include patch-clamp, electrophysiology, molecular biology and biochemistry.

### **PHYL 5017. Discovery Of Physiological Principles 3. 2 Credit Hours.**

This course consists of laboratory demonstrations and experiments in areas covered in Organ Systems Physiology 2 and acquisition of skills for analyzing and communicating the results of laboratory research. Corequisites: PHYL 5025.

### **PHYL 5025. Organ Systems Physiology 2. 4 Credit Hours.**

This course is a continuation of the study, begun in Organ System Physiology 1, of the mechanisms that produce and control the functions of the body's organ system. Prerequisites: PHYL 5011, PHYL 5014, PHYL 5021, and PHYL 5024.

### **PHYL 5041. Excitable Membranes. 1 Credit Hour.**

This course addresses fundamental mechanisms of cell excitability in neurons and other excitable tissues. The format is a combination of lectures, readings, discussions, a laboratory demonstration, and online simulations (where available). Examples of the latter include activities to simulate the resting membrane potential and action potentials. The module will emphasize contemporary issues in the scientific literature as well as translational science where dysfunction in ion channels underlie common disorders such as Alzheimer's Disease, Myasthenia Gravis, Cystic Fibrosis, Long QT Syndrome, and Epilepsy to name just a few. PHYL 5041 is a co-requisite for Fundamentals of Neuroscience I as it is the first module of that course, but it also can be taken as a standalone one-hour course.

### **PHYL 5042. Cardiovascular Physiology. 1 Credit Hour.**

This course explores the physiological mechanisms by which the cardiovascular system carries out its principle function. Mechanisms that produce and regulate cardiac pumping, organ blood flow, capillary fluid and solute exchange, and arterial blood pressure are examined. The nature and importance of various local, neural, and hormonal mechanisms are emphasized. Integrated control of cardiovascular function in situations requiring cardiovascular adjustments (e.g., exercise, blood pressure alterations) are also covered. Students may take the full series but are only required to take three out of the four courses (PHYL 5041, 5042, 5043, and 5044).

### **PHYL 5043. Respiratory & Renal Physiology. 1 Credit Hour.**

This course covers the physiology of respiratory and renal function in the human body. Our focus is on basic mechanisms of function, role in body homeostasis, as well as dysfunction of both systems associated with pulmonary and renal disease. Two sessions are set aside for discussion around significant advances in each field. One or more recently published articles will serve as the focus for each of these discussions sessions. Students may take the full series but are only required to take three out of the four courses (PHYL 5041, 5042, 5043, and 5044).

### **PHYL 5044. Metabolism/Hormones/GI System. 1 Credit Hour.**

The course serves to expose students to the current state of knowledge in the field of endocrinology and metabolism, including reproductive physiology, and the related topics of the physiology of the digestive tract. Three sessions are assigned to advanced topics. In these three sessions students will engage in a discussion format centered around one recent important publication. The lecturer will lead the discussion with the aim of showing how the topics the students have been exposed to integrate one with another, providing the context for present-day discoveries.

### **PHYL 5045. Mammalian Physiology. 4 Credit Hours.**

The course begins with fundamental processes that govern membrane transport, membrane potential, and excitation-contraction coupling. The course then proceeds to coverage of organ system function including cardiovascular, respiratory, renal, gastrointestinal and endocrine/metabolic physiology. Lecture material is enhanced by supplemental discussion of research literature encompassing molecular biology, integrative function, and pathophysiological implications. Students may take the full course but are only required to take three out of the four modules (PHYL 5041, 5042, 5043, and 5044).

### **PHYL 6020. Regulation of Glucose Metabolism. 3 Credit Hours.**

The normal regulation of glucose metabolism will be reviewed integrating whole body, organ, cellular, and molecular control mechanisms. Dysregulation of these control mechanisms in diabetes and other common metabolic disorders such as obesity and the metabolic syndrome will be examined in detail. State-of-the-art in vivo and in vitro techniques essential for the study of normal and deranged glucose homeostasis will be discussed in depth. Diabetic microvascular (nephropathy, retinopathy, neuropathy) and macrovascular complications and their relationship to impaired glucose metabolism will be reviewed. Lastly, pharmacologic therapy of diabetes and its associated complications will be discussed.

### **PHYL 6071. Supervised Teaching. 1 Credit Hour.**

A student enrolled in this course is expected to participate in the teaching program of the Department.

### **PHYL 6090. Seminar. 1 Credit Hour.**

The course is comprised of research presentations by Physiology graduate students. This course is required of all students each semester.

### **PHYL 6091. Selected Topics Of Physiology. 2 Credit Hours.**

Students must take a least two courses selected from among the offerings in: (1) Cardiovascular; (2) Cell Biology in Neural Science; (3) Endocrine and Metabolism; (4) Molecular Physiology; and (5) Ion Channels in Disease. Courses that may be substituted for one of these selections: (1) INTD 5040 - Fundamentals of Neuroscience I: Molecular, Cellular, and Developmental Neuroscience; (2) INTD 5043 - Fundamentals of Neuroscience II: Systems Neuroscience; (3) CSBL 6048 - Biology of Aging; and (4) CSBL 6058 - Neurobiology of Aging. Not all selected topics are offered each semester. Please discuss this with the Academic Coordinator for more details. Substituted courses in conflict with Physiology course schedule will require approval from COGS.

**PHYL 6097. Research. 1-12 Credit Hours.**

If a track chooses to give a seminar course, the specific course requirements will be determined by the track. The sub-designations for each track are: (1)Biology of Aging; (2) Cancer Biology; (3) Cell & Molecular Biology; (4) Genetics, Genomics & Development; (5) Membrane Biology & Cell Signaling; (6) Metabolism & Metabolic Disorders; (7) Microbiology & Immunology; (8)Molecular Biophysics & Biochemistry; (9) Molecular, Cellular, & Integrative Physiology; (10) Neuroscience; and (11) Pharmacology.

**PHYL 6098. Thesis. 1-12 Credit Hours.**

Registration for at least one term is required of M.S. candidates.  
Prerequisite: admission to candidacy for Master of Science degree.

**PHYL 6291. Seminar 2. 1 Credit Hour.**

Presentation and discussion of recent research advances by outside scientists.

**PHYL 7099. Dissertation. 1-12 Credit Hours.**

Registration for at least two terms is required of Ph.D. candidates.  
Prerequisites: admission to candidacy for the Ph.D. degree.