CLBY 416. Fundamental Immunology. 4 Units.
Introductory immunology providing an overview of the immune system, including activation, effector mechanisms, and regulation. Topics include antigen-antibody reactions, immunologically important cell surface receptors, cell-cell interactions, cell-mediated immunity, innate versus adaptive immunity, cytokines, and basic molecular biology and signal transduction in B and T lymphocytes, and immunopathology. Three weekly lectures emphasize experimental findings leading to the concepts of modern immunology. An additional recitation hour is required to integrate the core material with experimental data and known immune mediated diseases. Five mandatory 90 minute group problem sets per semester will be administered outside of lecture and recitation meeting times. Graduate students will be graded separately from undergraduates, and 22 percent of the grade will be based on a critical analysis of a recently published, landmark scientific article. Offered as BIOL 316, BIOL 416, CLBY 416, PATH 316 and PATH 416. Prereq: Graduate standing.

CLBY 417. Cytokines: Function, Structure, and Signaling. 3 Units.
Regulation of immune responses and differentiation of leukocytes is modulated by proteins (cytokines) secreted and/or expressed by both immune and non-immune cells. Course examines the function, expression, gene organization, structure, receptors, and intracellular signaling of cytokines. Topic include regulatory and inflammatory cytokines, colony stimulating factors, chemokines, cytokine and cytokine receptor gene families, intracellular signaling through STAT proteins and tyrosine phosphorylation, clinical potential, and genetic defects. Lecture format using texts, scientific reviews and research articles. Recommended preparation: PATH 416 or equivalent. Offered as BIOL 417, CLBY 417, and PATH 417.

CLBY 435. Seminar in Molecular Biology/Microbiology. 1 Unit.
Graduate students will attend the departmental seminar given by all graduate students in the Department of Molecular Biology and Microbiology, in the Molecular Virology Program, and in the Cell Biology Program, as well as give a seminar on their own thesis research. Students will be evaluated by the faculty member in charge of that student’s seminar with input from the students’ own thesis committee. After each seminar, the student presenter will meet with other graduate students for peer-review of the content, delivery, and style of the seminar. Peer reviewers will also be evaluated for the quality of their input. Offered as CLBY 435 and MBIO 435 and MVIR 435.

CLBY 450. Cells and Pathogens. 3 Units.
Modern molecular cell biology owes a great debt to viral and bacterial pathogens as model systems. In some instances pathogens operate by faithful mimicry of host proteins, and other cases represent the result of extensive molecular tinkering and convergent evolution. This course will also explore numerous mechanisms utilized by pathogens to subvert the host and enhance their own survival. Topics covered include nuclear regulatory mechanisms, protein synthesis and stability, membrane-bound organelles, endocytosis and phagocytosis, and factors that influence cell behavior such as cytoskeleton rearrangements, cell-cell interactions, and cell migration. Additional topics include cell signaling and co-evolution of pathogens and host cell functions. Students are expected to come to class prepared to discuss pre-assigned readings consisting of brief reviews and seminal papers from the literature. Student assessment will be based on effective class participation (approximately 80%) and successful presentation of an independent research topic (approximately 20%). Offered as CLBY 450, MBIO 450, and MVIR 450. Prereq: CBIO 453 and CBIO 455 or permission of instructor.

CLBY 466. Cell Signaling. 3 Units.
This is an advanced lecture/journal/discussion format course that covers cell signaling mechanisms. Included are discussions of neurotransmitter-gated ion channels, growth factor receptor kinases, cytokine receptors, G protein-coupled receptors, steroid receptors, heterotrimeric G proteins, ras family GTPases, second messenger cascades, protein kinase cascades, second messenger regulation of transcription factors, microtubule-based motility, actin/myosin-based motility, signals for regulation of cell cycle, signals for regulation of apoptosis. Offered as CLBY 466, PHOL 466 and PHRM 466.

CLBY 468. Membrane Physiology. 3 Units.
This student-guided discussion/journal course focuses on biological membranes. Topics discussed include thermodynamics and kinetics of membrane transport, oxidative phosphorylation and bioenergetics, electrophysiology of excitable membranes, and whole and single channel electrophysiology, homeostasis and pH regulation, volume and calcium regulation. Offered as CLBY 468 and PHOL 468.

CLBY 488. Yeast Genetics and Cell Biology. 3 Units.
This seminar course provides an introduction to the genetics and molecular biology of the yeasts S. cerevisiae and S. pombe by a discussion of current literature focusing primarily on topics in yeast cell biology. Students are first introduced to the tools of molecular genetics and special features of yeasts that make them important model eukaryotic organisms. Some selected topics include cell polarity, cell cycle, secretory pathways, vesicular and nuclear/cytoplasmic transport, mitochondrial import and biogenesis, chromosome segregation, cytoskeleton, mating response and signal transduction. Offered as CLBY 488, GENE 488, MBIO 488, and PATH 488.

CLBY 511. Cell Biology Seminar. 1 Unit.
The Cell Biology Seminar provides a forum for presentation and discussion of contemporary issues in Cell Biology. Students, fellows, local faculty and guest speakers present both research talks and journal clubs.

CLBY 512. Cell Biology Seminar. 1 Unit.
The Cell Biology Seminar provides a forum for presentation and discussion of contemporary issues in Cell Biology. Students, fellows, local faculty and guest speakers present both research talks and journal clubs.

CLBY 519. Molecular Biology of RNA. 3 Units.
Selected topics regarding editing, enzymatic function, splicing, and structure of RNA. Offered as BIOC 519, CLBY 519, and MBIO 519.

CLBY 525. Protein Misfolding and Human Disease: Molecular Basis and Clinical Implications. 3 Units.
This is a graduate-level seminar course that familiarizes the students with human diseases resulting from aberrations in protein folding, processing, and turnover. Contribution of associated inflammation and heavy metal mis-metabolism will be discussed where appropriate. Specific examples include, but are not limited to, Alzheimer’s Disease, Parkinson’s Disease, Prion disorders multiple sclerosis, amyotrophic lateral sclerosis, Huntington’s Disease, and others based on popular demand. The students will be expected to discuss relevant research publications in an interactive format. Grading will be based on class participation and an R21 grant proposal on the subject of their choice that does not overlap with their current area of research. Recommended Preparation: Concurrent enrollment in PATH 526, on grant-writing skills, is highly recommended but not required. Offered as PATH 525 and CLBY 525.
CLBY 526. Cell Biology and Human Disease. 3 Units.
This course is designed to provide broad base of knowledge regarding
cell structure and function. The basic structure of the cell will be
discussed, as will the various functional systems that are superimposed
upon and interact with this structure. The course will discuss organelle
biogenesis, materials movement inside cells, cell interaction with the
external environment, cell cycle and cell death regulation, cytoskeleton
dynamics, quality control mechanisms, and basic signal transduction
concepts. The course will also discuss how abnormal cell function may
lead to human disease, and how basic cell function may be harnessed by
intracellular pathogens to provide favorable intracellular environments
for replication. The major goals of this course are to provide students
with a working knowledge of the cell to facilitate understanding of the
scientific literature, and to familiarize students with modern experimental
approaches in cell biology. The course will rely heavily on student
participation. Students will be provided with study guides with the
expectation they will come to class prepared to lead interactive group
discussions with minimal input from instructors. Offered as CLBY 526,
MBIO 526 and MVIR 526.

CLBY 599. RNA Structure and Function. 3 Units.
This course will cover fundamental aspects of modern RNA biology
with emphasis on the interplay of three dimensional structure of nucleic
acids and their function. The main focus of the course is on the recent
discoveries that indicate a prominent role of RNA as a major regulator of
cellular function. Topics discussed will include an introduction to RNA
structure, folding and dynamics, RNA/RNA and RNA-protein interactions,
and role of RNA in catalysis of biological reactions in ribosome and the
role of other catalytic RNAs in tRNA biogenesis, pre-mRNA splicing, and
viral replication. The course also covers the recently discovered RNA
regulatory switches, large noncoding regulatory RNAs, and the role of
RNA in human diseases and novel, RNA-based therapeutics. Offered as
BIOC 599, CLBY 599, and MBIO 599.

CLBY 601. Special Problems. 1 - 18 Units.
This is the listing for independent research. Students should enroll in
this course once they have selected their laboratory for Ph.D. research.
The number of credit hours depends on how many didactic courses they
are following at the same time. Once they have passed their qualifying
examination they should register for CLBY 701.

CLBY 701. Dissertation Ph.D.. 1 - 9 Units.
This is the listing for independent research toward the Ph.D. The number
of credit hours depends on how many didactic courses students are
following at the same time. Students may register for this course only
once they have passed their qualifying examination. Prereq: Predoctoral
research consent or advanced to Ph.D. candidacy milestone.