Students must complete 6 credit hours of combined science electives

BIOL 362/462 *(3 credit hours)*: *Principles of Developmental Biology*

The descriptive and experimental aspects of animal development. Gametogenesis, fertilization, cleavage, morphogenesis, induction, differentiation, organogenesis, growth, and regeneration. Students taking the graduate-level course will prepare an NIH-format research proposal as the required term paper. Offered as BIOL 362, BIOL 462 and ANAT 462.

CLBY 435 *(1 credit hour)*: *Seminar in Molecular Biology/Microbiology*

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 *(1 credit hour)*: *Cells and Pathogens*

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%).

CLBY 525 ***(3 credit hours)***: *Neurodegenerative Diseases of the Brain and the Eye: Molecular Basis of the Brain-Eye Connection*

This is a graduate-level seminar course that familiarizes students with common neurodegenerative conditions of the brain and the eye. The molecular basis of each disorder and associated ophthalmic pathology will be emphasized. Contribution of heavy metals in brain and ocular pathology will be discussed where appropriate. Specific examples include Alzheimer's Disease, Parkinson's Disease, prion disorders, Huntington's Disease, age-related macular degeneration, glaucoma, and others based on popular demand. The students will be expected to discuss relevant research publications in class in an interactive format. Grading will be based on class participation and completion of an R21 grant proposal. Concurrent enrollment in **PATH 526** on grant writing skills is strongly recommended but not required.

CRSP 412 ***(1 credit hour)***: *Communication in Clinical Research - Grant Writing*

Written communication is a critical skill in clinical science. We disseminate our work to others through publications, and we obtain the resources to conduct research through grant proposals. This course has been developed for Kl2 and CRSP scholars. The course focuses on writing grant proposals and, in particular, specific sections of an NIH-style grant. However, the principles discussed in the course apply to any type of proposal.

Review all course descriptions via the CWRU General Bulletin