**BIOMEDICAL GRADUATE STUDIES (BIOM)**

**BIOM 502 Molecular Basis of Disease**
BIOM 502 introduces students to basic mechanisms of disease and examines a different disease each week. The focus of the course will be on understanding the pathophysiology of the diseases and how research has enhanced not only our knowledge of disease mechanisms but has also led to improved therapy for patients with these diseases. This course is reserved for BGS students only. Prerequisite: Permission of course director.

Taught by: Dr. Jonathan Katz and Dr. Jennifer Punt
Course usually offered in spring term
Activity: Lecture
1.0 Course Unit

**BIOM 510 Case Studies in Translational Research (CSTR) (Open to MD/PhD and VMD/PhD students only)**
This course is open to MD/PhD, VMD/PhD and Biomedical Graduate Studies PhD students. All second year combined degree students are expected to take this course unless excused by Dr. Brass. Enrollment is limited to 24 students but interested VMD/PhD and BGS students are welcome as space permits. Prerequisite: Must be in the MD/PhD or VMD/PhD program and have completes the first year of training. CSTR is a seminar style course where groups of students work with selected Penn faculty to prepare a discussion and literature review on disease topics. Topics will include gene therapy for hemophilia, retinal disease and wound healing, cytokine therapies for immune disorders, genetic sleep disturbances and vaccine development. Most of the course will focus on the analysis of successful translational research projects that are taking place here at Penn.

Taught by: Drs. Mitch Weiss, Emma Meagher and Skip Brass
Course usually offered in fall term
Activity: Seminar
1.0 Course Unit

**BIOM 555 Regulation of the Genome**
Regulation of gene expression including chromatin structure, transcription, DNA modification, RNA processing, translation, control of gene expression via microRNAs and post-translational processing. Prerequisite: Permission of instructors.

Taught by: Drs. Zhaolan Zhou and Ben Black
Course usually offered in spring term
Activity: Lecture
1.0 Course Unit

**BIOM 600 Cell Biology**
BIOM 600 is a beginning-to-intermediate-level graduate school course designed to introduce students to the molecular components and physiological mechanisms that underlie the structure and function of eukaryotic cells. The course emphasizes core cell biology concepts by describing both landmark experiments and methods as well as current scientific research questions and technical approaches. Lectures will focus on discoveries involving: (i) molecular mechanisms of cellular communication; (ii) intracellular compartmentalization, protein/vesicle targeting, and organelle biogenesis; (iii) mechanisms of membrane transport and excitability; (iv) cytoskeletal architecture, cell adhesion, and cell motility; and (v) cell fate. The main goal of the course is to provide a strong foundational basis for the biomedical student's graduate education especially in the practice of solving research problems in the context of cell biology. The format and content of the course conveys to students not only how scientists what they know but also the tremendous excitement that has paralleled rapid advances in understanding cell structure, organization, and function in recent years.

Permission of instructor required to enroll.

Taught by: Dr. Kurt Engleka, Course Director
Course usually offered in fall term
Activity: Lecture
1.0 Course Unit

**BIOM 611 Statistics in Experimental Design and Analysis**
BIOM 611 is an introductory course providing an overview of fundamental concepts in biostatistics as they relate to experimental design and analysis. It introduces the student as well to the related concepts of premise and reproducibility. The first unit introduces the statistical method as a series of six steps. In the first unit we explore the strength of evidence supporting a particular research hypothesis, consider the generalizability of our conclusion and estimate the magnitude of the effect. The second unit specifically introduces methods for comparing means and proportions between groups, and the analysis of paired data. We conclude by considering differences in means and proportions between multiple groups and associations between quantitative variables. Analysis of variance (ANOVA), correlation and linear regression are explored. Statistical methods will be implemented using the software package R (in Rstudio). Students will have an opportunity to code directly in R or to use the graphical paper interface, Rcmdr to facilitate work with R. This course is NOT recommended for students with a strong quantitative backgorund. Those of you with a strong background should take a statistics course with more rigorous mathematical underpinnings and or with exposure to more advanced statistical methods. Discuss with advisor or see the following page for detailed instructions. www.med.upenn.edu/bgs/documents/BGSStatisticsRequirements10-6-16.pdf

Taught by: J. Richard Landis, PhD
Course usually offered in spring term
Activity: Lecture
1.0 Course Unit