

Major Electives - 9-10 Credit Hours (6 hours are required 3000+ level)

PHARMACEUTICAL SCIENCES ELECTIVES

- **PMCY 2020 – 3 credits**
Pills, Potions, and Drugs in Modern Medicine - This course is designed to introduce students to the basic scientific concepts and policy that form the foundation of the various pharmaceutical related fields necessary to provide these healthcare functions. To this end, the course starts with students exploring how diseases and related drug targets are prioritized for development by biopharma and academia and finishes with how these therapies are produced at scale and the role pharmacists play in delivering those medications to the patient. In-between, students learn the general path these therapies must travel to be available to healthcare providers. Along the way, students learn and apply basic knowledge of natural sciences in qualitative and quantitative manner to diseases of human concern.
- **PMCY 4000 – 3 credits**
The War on Cancer - In-depth discussions of cancer, which include the tumor biology, treatment options (surgery, radiation and chemotherapy), socioeconomic challenges, and the remaining barriers that are preventing cures in specific types of cancer.
Offered spring semester.
- **PMCY 4010E – 3 credits**
Introduction to drugs, biologics and devices regulated by FDA - Introduction to the drugs, biologics and devices regulated by FDA and the pharmaceutical, biotechnology and medical device industries. Organization of the FDA, basic understanding of regulatory framework in the US including regulations and regulatory process, overview of product development and new product applications process and post-marketing/commercialization compliance expectations.
Offered fall semester.
- **PMCY 4410E – 2 credits**
Robotic Technology in Drug Discovery and Toxicology - Designed to train students on three principal objectives which comprise the second and third stages of a drug discovery pipeline. Beyond its own course objectives, this course also serves as the first of three two-credit courses in a series that encompass aspects of the drug discovery pipeline.
Offered fall semester.
- **PMCY 4420E – 2 credits**
Computation Approaches in Drug Discovery and Toxicology - In-depth study of the first, second, and third stages of a drug discovery pipeline. This is the second of a three-course series that encompasses aspects of the drug discovery pipeline.
Offered spring semester.
- **PMCY 4430E – 2 credits**
Biopharmaceutics and Pharmacokinetics - Designed to train students on three principal objectives, which comprise the second and third stages of a drug discovery pipeline. Beyond its own course objectives, this course is the last of three two-credit course series that encompass aspects of the drug discovery pipeline.
- **PMCY 5050/7050 – 3 credits**
Abused Drugs - The history, abuse, misuse, effects, and detection of selected drugs. Guest lecturers are invited to present their views on these subjects.
Offered fall, spring and summer semester every year.

OTHER ELECTIVES

- **BCMB 3600 – 3 credit hours**
Genomics and Bioinformatics - A focus on the remarkable impact that genome sequencing projects is having on virtually all aspects of biochemistry, as well as on medicine and biotechnology. An introduction to a broad range of 'omic' topics, including functional genomics, microarrays, proteomics, physiological genomics, and bioinformatics.
Offered spring semester every year.
- **BCMB 4030L/6030L – 4 credit hours**
Bioprocess Technology - Introduction to concepts in Biotechnology. Students will examine lab safety, quality systems, calculations, doubling time, protein analysis, downstream processing, design of experiments, protein expression, and protein purification. This lab class will include projects for student teams to work on as well as out-of-class assignments.
Offered fall and spring every year.
- **BCMB 4200/6200 – 3 credit hours**
Biotechnology - Applied aspects of biochemistry and molecular biology in various fields, with emphasis on the use of recombinant DNA methods and protein engineering.
Offered spring semester every year.
- **BIOL 1108/1108L – 4 credit hours**
Principles of Biology II - Microbial diversity and physiology; plant and animal diversity, growth, reproduction and physiology; ecology.
Offered fall, spring and summer semester every year.
- **BIOS 3000 – 3 credits**
Intermediate Biostatistics for Public Health Sciences - A survey of statistical methods with applications in public health and the biological sciences, including multiple regression, clinical trials, analysis of variance, categorical data analysis, and logistic regression. Motivating examples are drawn from public health and biomedicine.
Offered fall and spring every year.
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- **CBIO 3010 - 4 credits**
Gross Anatomy - A survey of the gross structure of the human body accompanied by laboratory cat dissection. The course is intended for upper-level undergraduates preparing for careers in the biomedical sciences.
Offered fall and spring semester every year.
- **CBIO 3400 – 3 credits**
Cell Biology - Structure and function of cells: cell architecture and organization, cell cycle, membrane phenomena, organellogenesis, energy transduction, and cellular control mechanisms.
Offered fall, spring and summer semester every year.
- **CBIO 3710 – 3 credits**
Principles of Physiology - Principles of integrative systems physiology, emphasizing humans and current mammalian animal research models. Organismal homeostasis, including cardiovascular, respiratory, renal, digestive, and reproductive systems. Emphasis on the integrative actions of the nervous and endocrine systems.

- **CHEM 4113- 3 credits**
Advanced Organic Chemistry III - Builds on fundamental principles established in the first two semesters of organic chemistry. Topics include polymers and polymerization, catalysis, organometallic coupling reactions, pericyclic reactions, and the organic chemistry of carbohydrates, amino acids/peptides/proteins, lipids, and nucleic acids/DNA/RNA.
Offered fall semester every year.
- **CHEM 4120- 3 credits**
Chemistry of Drug Design and Drug Action - The rational basis for drug design, discovery, and development, as well as the chemical and physical basis for drug action will be discussed. Topics will include structure-activity relationships, organic synthesis, organic mechanisms, mechanisms of action, metabolism, toxicity, computer-assisted drug design, case studies, history, and other fundamental topics.
Offered spring semester every odd-numbered year.
- **EPID 2010-3 credits**
Disease Detectives - Introduces students to the world of epidemiology, the basic science of public health, and helps them understand how it affects all of our lives. It presents epidemiology as a scientific way of thinking applicable to a wide range of fields, and offers current, tangible examples from today's headlines.
Offered every spring semester.
- **GENE 3200-3 credits**
Genetics - Genetic mechanisms in viruses, bacteria, and eukaryotic cells in a comparative sense. Topics include molecular genetics and gene action, transfer systems and mapping, cytological, quantitative, and population genetics.
Offered fall, spring and summer semester every year.
- **MIBO 3000 - 4 credits**
Introductory Applied Microbiology - Microorganisms, with special emphasis on the structure, function, and diversity of bacteria and their importance to man. Online lectures and examinations.
Offered spring semester every year.
- **MIBO 3500-3 credits**
Introductory Microbiology - Microorganisms, with special emphasis on bacteria, their structure, function, diversity, and importance to man. Live course.
Offered fall, spring and summer semester every year.
- **PHYS 1212/1212L-4 credit hours**
Principles of Physics for Scientists and Engineers-Electricity and Magnetism, Optics, Modern Physics - The continuation of Introductory Physics for Science and Engineering Students-Mechanics, Waves, Thermodynamics. Electricity, electric fields, and electric circuits, magnetism and magnetic fields, geometric and wave optics, and elementary atomic and nuclear physics.
Offered fall and spring semester every year.
- **STAT 4210-3 credits**
Statistical Methods - Statistical distributions; one- and two-population tests about means, including t-tests and paired-difference tests; one- and two-population tests about the variance; contingency tables and goodness-of-fit tests; non-parametric tests; analysis of variance and simple experimental designs; linear regression and residual diagnostics.
Offered fall, spring and summer semester every year.

- **STAT 4220–3 credits**
Applied Experimental Designs - Constructing and analyzing statistical experimental designs; blocking, randomization, replication and interaction; complete and incomplete block designs; factorial experiments; repeated measures; confounding effects.
Offered fall and spring semester every year.
- **STAT 4230–3 credits**
Applied Regression Analysis - Applied methods in regression analysis. Topics include univariate linear regression, techniques of multiple regression and model building, ANOVA as regression analysis, analysis of covariance, model selection and diagnostic checking techniques, nonlinear regression, and logistic regression.
Offered fall, spring and summer semester every year.