

Course Requirements for BME Students in Biomolecular Pharmacology Training Program

Year 1 Fall (14 cr)

ENG BE 505 Molecular Bioengineering (**4 cr**) lecture: T,Th 10-12 pm, lab: M 12-3 pm
or T 12-3 pm

BME Core-curriculum elective #1 (from BE 506, BE 521, BE 567, BE 703, BE 747) (**4 cr**)

GMS BI 755 General Biochemistry (**4 cr**) M,W 10-12 pm, F 11:30-12:30 pm

GMS PM 710 Lab Rotations (**2 cr**)

Year 1 Spring (14 cr)

ENG BE 706 Quantitative Physiology for Engineers (**4 cr**) lecture: M,W 10-12 pm,
lab: M 4-7 pm, Tues 9-12, or Tues 1-4, discussion: F 11-12 pm

BME Core-curriculum elective #2 (from BE 506, BE 521, BE 567, BE 703, BE 747) (**4 cr**)

GMS PM 700 Molecular Neurobiology and Pharmacology (**4 cr**) tba: W,F 3:30-5:30 pm

GMS PM 710 Lab Rotations (**2 cr**)

Year 2 Fall (6 cr)

GMS PM 800 Advanced General Pharmacology (**2 cr**) F 1-3 pm

ENG BME elective (also meets Program elective) (**4 cr**)

Year 2 Spring (2 cr)

GMS PM 810 Current Topics in Pharmacological Sciences (**2 cr**) W 12 noon-1:30 pm
(lunch provided), seminar 2-3 pm

Total Course Credits 36 cr

Total Research Credits 28 cr

Descriptions of BME Required Courses

ENG BE 505 Molecular Bioengineering I Prereq: ENG EK 424 or equivalent, graduate standing. Undergraduates must have stamped approval. The course is an engineering science-based introduction to the building blocks of living cells and materials for biotechnology. Throughout the course, detailed structural and energetic properties of molecules are emphasized. Topics include: 1) biological pathways for synthesis of DNA, RNA, and proteins, 2) formal physical and mathematical treatment of transduction, transmission, storage, and retrieval of biological information by macromolecules, 3) polymerase chain reaction, restriction enzymes, and DNA sequencing, 4) energetics of protein folding and trafficking, 5) energetic mechanisms of enzymatic catalysis and receptor-ligand binding, 6) cooperative proteins, multi-protein complexes and the control of metabolic pathways, 7) generation, storage, transmission, and release of biomolecular energy, and 8) physical bases of methods for study and manipulation of molecules, including isolation, purification, detection, chemical characterization, and visualization of structure. 4 cr.

ENG BE 706 Quantitative Physiology for Engineers Pre- or Coreq: CAS MA 226, ENG BE 401, graduate standing or consent of instructor. Course in human physiology for biomedical engineering students. Fundamentals of cellular and systems physiology, including the nervous, muscular, cardiovascular, respiratory, renal, gastrointestinal, endocrine, and immune systems. Quantitative and engineering approaches will be applied to understanding physiological concepts. 4 cr.

Description of GMS Biochemistry Course

GMS BI 755/756 Biochemistry A, B *Prereq: Organic Chemistry or equivalent, and consent of instructor.* This two-semester course provides the biochemical foundation for advanced studies in basic and clinical sciences. Topics presented in the first semester include the structure and function of macromolecules, the mechanisms of enzyme action, the metabolism of carbohydrates and lipids, as well as bioenergetics. The second semester continues with the metabolism of lipids, amino acids and nucleotides, the control of metabolic processes, the function of hormones, biochemical genetics, and transcriptional and translational events. *Kandror.* 4 cr, 1st and 2nd sem.