Courses for Fall 2015

Master List 7.1.2015

BIOCHEMISTRY:

http://www.biochem.duke.edu/

First Half Semester:

BIOCHEM 658 (SBB 658) Structural Biochemistry I – [Structure of Macromolecules] Principles of modern structural biology. Protein-nucleic acid recognition, enzymatic reactions, viruses, immunoglobulins, signal transduction, and structure-based drug design described in terms of the atomic properties of biological macromolecules. Discussion of methods of structure determination with particular emphasis on macromolecular X-ray crystallography NMR methods, homology modeling, and bioinformatics. Students use molecular graphics tutorials and Internet databases to view and analyze structures. Prerequisites: organic chemistry and introductory biochemistry. *Minicourse, 1st half-semester. MWF 3:20-4:10 pm; Beese; 439 Nanaline Duke Bldg; 2 Units*

Second Half Semester:

BIOCHEM 659 (CELLBIO, IMMUNOL, SBB, UPGEN 659) Structural Biochemistry II – [Molecular Biology I] Continuation of BIOCHEM 658. Structure/function analysis of proteins as enzymes, kinetics of binding, catalysis and allostery, protein folding, stability and design protein-protein interactions. Prerequisite: Biochemistry 658, organic chemistry, physical chemistry, and introductory biochemistry. This is an introductory course to learn how to use quantitative methods to understand biological structure and function. *Minicourse, 2nd half-semester. MWF 3:20-4:10 pm; Zhou; 439 Nanaline Duke Bldg; 2 Units*

BIOCHEM 681 (SBB 681) Physical Biochemistry – A structure-based introduction to the role of thermodynamic driving forces in biology. An overview of experimental sources of structural and dynamic data, and a review of the fundamental concepts of thermodynamics. Both concepts are combined to achieve a structural and quantitative mechanistic understanding of allosteric regulation, and of coupled ligand binding and conformational change. Statistical thermodynamics is used to develop ensemble models of protein and nucleic acid dynamics. This treatment leads into specific examples and general principles of how to interpret structural and dynamic information toward the purposes of other research. Instructor consent required. *TuTh, 10:05-11:20 am; Oas; 147 Nanaline Duke Bldg; 3 Units*

BIOLOGY:

http://www.biology.duke.edu/

First Half Semester:

BIOLOGY 701 – Succeeding in Graduate School in the Biological Sciences – Weekly lecture and Q&A on choosing a thesis advisor, the grant proposal and scientific manuscript peer review processes, and other topics related to succeeding in graduate school. Also counts for RCR credit. Minicourse, 1st half-semester. W 12:00-1:00PM; Noor; LSRC A247; 0.5 Units

BIOLOGY 723 - Statistical Computing for Biologists - Statistical computing for the biological sciences with an emphasis on common multivariate statistical methods and techniques for exploratory data analysis. Goal of the course is to help graduate students in the biological sciences develop practical insights into methods they are likely to encounter in their research. Provides introductions to "R" statistical computing environment and Python programming language. Tu 3:05PM - 5:35PM; Magwene; Bio Sci 154; 3 units.

BIOLOGY 782 (CELLBIO 810) - Mechanisms of Development/Developmental Genetics – See CELLBIO 810

BIOLOGY 783 (CELLBIO 820) -Developmental Genetics – see CELLBIO 820

Second Half Semester:

BIOLOGY 702 - Succeeding Beyond Grad School: Career Options with a PhD in the Biological Sciences - Succeeding Beyond Grad School: Career Options with a PhD in the Biological Sciences - Weekly lecture and Q&A on alternative careers in the biological sciences, preparing job applications, and other topics related to succeeding beyond graduate school. Also counts for RCR credit. Minicourse, 2nd half-semester. W 12:00-1:00PM; Noor; LSRC A247; 0.5 Units

CELL AND MOLECULAR BIOLOGY:
http://cmb.duke.du

CMB 551 Cell and Molecular Biology – [Core Course] The Cell and Molecular Biology core course (CMB551) offers 27 topic areas covering a wealth of cell and molecular biology in a flexible modular format. This class is assigned 4 graded credit hours per semester. The module topics emphasize either in-depth critical discussion of the primary literature, an emphasis on developing quantitative/mathematical approaches to the biology, or both. The course consists of a sequence of six consecutive modules – within each module there are four or five topics. Students choose one topic per module. Each module contributes 10% of the final grade (60%) with the remaining 40% of the grade deriving from the final symposium or workshop. ***MWF 10:20-11:40 am; Mathey-Prevot; Locations: TBD; 4 Units***

CMB 733.01 (NEUROBIO, PHARM) – Experimental Design and Biostatistics for Basic Biomedical Scientists – See PHARM 333.01

CMB 733.02 (NEUROBIO, PHARM) – Experimental Design and Biostatistics for Basic Biomedical Scientists – See PHARM 333.02

CMB 733.03 (NEUROBIO, PHARM) – – Experimental Design and Biostatistics for Basic Biomedical Scientists Statistics – See PHARM 333.03

CMB 764 Cell and Molecular Biology Colloquium – [Student Seminar] Required of all CMB students. Each Monday at noon, presentations by upper-year students: one student talks about ongoing dissertation research and another introduces a research paper relevant to that week's seminar. Students attend the Thursday seminar and can have lunch with the speaker. Credit is based on attendance. *M 11:55-1:00 pm; Kuehn; 143 Jones Building; 2 Units*

UPGEN 778 (MGM, UPGG) - Genetic Approaches to the Solution of Biological Problems – See UPGG 778

First Half Semester:
CMB 797 Modern Techniques in Molecular Biology - This course introduces the fundamental laboratory techniques used in basic research. It is divided into two sections. One section covers techniques used for protein purification, analysis, and the study of protein-protein interactions. The second covers nucleic acid based techniques, including a review of basic nucleic acid chemistry, enzymatic modification, qualitative and quantitative PCR, nucleic acid sequencing, cloning strategies, vectors, and measurement of transcript expression including microarray techniques. This course is built around a team-based learning model. Course reading material and recorded lectures are provided to students to review before class and class time is spent reinforcing the material through problem sets and group discussion. *Minicourse, 1st half-semester MWF 8:45-9:45 am; Madan Kwatra; Nan Duke 384; 2 Units*

Courses for Fall 2015

Master List 7.1.2015

CELL BIOLOGY:

http://www.cellbio.duke.edu

CELLBIO 701 Human Structure and Function. This core course of the preclinical curriculum presents scientific principles underlying the structure and function of the normal human body. Focus is given to the gross anatomy, microscopic anatomy, and physiology of nine organ systems providing the foundation for the practice of medicine. The course objectives are to ensure that all students possess a conceptual model of the structure and integrated function of the human body as an intact organism and each of its major organ systems, emphasizing their role in the maintenance of the body's homeostasis. Enrollment is restricted to pathologists' assistant students. Course director: Dr. Emma Jakoi. Credit 12 units.

CELLBIO 551 Cell and Molecular Biology – This class teaches 24 topics covering a wealth of cell and molecular biology in a flexible modular format. In the course of covering the topic, most modules involve either in-depth critical discussion of primary literature, or an emphasis on developing quantitative/mathematical approaches to the biology, or both. Each module consists of six classes. Students may select any six (non-concurrent) modules to take. Each module contributes to 10% of the final grade. At the end of the class, students pair up and devise a research proposal that is honed over a two week period with an assigned faculty coach. All proposals are presented orally to the entire class (students and instructors) in a 2-day symposium in mid-December, contributing 40% of the final grade. *MWF 10:20-11:40 am; Nicchitta; Mathey-Prevot, 384 Nanaline Duke Bldg and 437 Nanaline Duke Bldg; 4 Units*

First and Second Half Semester:

CHEMISTRY: For a complete listing, please go to: http://www.chem.duke.edu/graduates/courses.php

COMPUTATIONAL BIOLOGY & BIOINFORMATICS:

http://genome.eduke.edu/CBB/

CBB 520 Genome Tools and Technologies - The course introduces the laboratory and computational methodologies for genetic and protein sequencing, mapping and expression measurement. Prerequisites: Students are expected to have some background course work in genetics, molecular biology, biochemistry, and a modern programming language. *TuTh 10:05-11:20 am; Dietrich; Physics 150, 3 Units*

CBB 574 (New Course) Modeling and Engineering Gene Circuits - This course discusses modeling and engineering gene circuits, such as prokaryotic gene expression, cell signaling dynamics, cell-cell communication, pattern formation, stochastic dynamics in cellular networks and its control by feedback or feedforward regulation, and cellular information processing. The theme is the application of modeling to explore "design principles" of cellular networks, and strategies to engineer such networks. Students need to define an appropriate modeling project. At the end of the course, they're required to write up their results and interpretation in a research-paper style report and give an oral presentation. Prerequisites: Biomedical Engineering 260L or consent of instructor. WF. 1:25pm-2:40pm; Instructor You, 3 units

IMMUNOLOGY:

http://immunology.mc.duke.edu

IMMUNOL 544 Principles of Immunology - This is a graduate level course that is open to both graduate students and advanced undergraduates. It is an introduction to the molecular and cellular basis of the immune response. Topics include anatomy of the lymphiod system, lymphocyte biology, antigen-antibody interactions, humoral and cellular effector mechanisms,

and control of immune responses. The last third of the course focuses on special topics and application such as transplantation, autoimmunity, immunodeficiency, and tumor immunity. On selected days, the class is broken down into small discussion groups of approximately 15 students to discuss material introduced in the lectures or to work on problem sets. Graduate students in the Department of Immunology lead these sections. *MWF 1:30-2:20 pm; Zhang & Zhuang; 143 Jones Bldg; 3 Units*

IMMUNOL 601 Immunology of Human Disease - This advanced course will cover the immune aspect of various human diseases including autoimmune diseases, allergy, tumor, inflammation and infectious diseases. Required course for all students specializing in immunology. Prior course requirement: IMM544.Tues/Thurs 10:05-11:20 am; He & St. Clair; 321Jones Bldg; 3 Units.

IMMUNOL 701D Pillars of Immunology – This course will cover discoveries of historical importance in the field of immunology through student presentations and discussions of classical papers. Intended for students seeking a PhD in Immunology. F 10:20-11:20 am; Tedder & Krangel; Jones 321; 1 Unit

IMMUNOL 735 Topics in Immunology - Focus on current immunology research, emphasizing emerging research areas and new directions in established areas. Students present recent papers in selected subjects. Required course for all students specializing in immunology. *Th 9-10 am; Shinohara & Ciofani; 001 MSRB I; Credit/no credit grading only; 1 Unit.*

IMMUNOL 791A Research in Immunology – This course is the first of two for first year students enrolled in the Immunology Graduate Program designed to introduce bench work in immunology and to expose students to a variety of techniques to increase their proficiency. One to two research rotations will be conducted in training faculty laboratories for periods of 10-12 weeks. Rotations should be approved by the DGS. The second course is IMMUNOL791B offered in the spring. Both courses must be taken in order for the four total credits and grades to post. 2 Units

Second Half Semester:
IMMUNOL 659 / BIOCHEM 659 Structural Biochemistry II - See BIOCHEM 659

INTEGRATED TOXICOLOGY AND ENVIRONMENTAL HEALTH (CERTIFICATE):
http://sites.nicholas.duke.edu/envhealth/

CMB 551 Cell and Molecular Biology - See CMB 551

ENVIRON 501 Environmental Toxicology - Study of environmental contaminants from a broad perspective encompassing biochemical, ecological, and toxicological principles and methodologies. Discussion of sources, environmental transport and transformation phenomena, accumulation in biota and ecosystems. Impacts at various levels of organization, particularly biochemical and physiological effects. Prerequisites: organic chemistry and vertebrate physiology or consent of instructor. *MW 10:05-11:20 am; Di Giulio, Meyer, LSRC A155; 3 Units*

ENVIRON 530 Chemical Fate of Organic Compounds - Equilibrium, kinetic, and analytical approaches applied to quantitative description of processes affecting the distribution and fate of anthropogenic and natural organic compounds in surface and groundwaters, including chemical transfers between air, water, soils/sediments, and biota; and thermochemical and photochemical transformations. The relationships between organic compound structure and environmental behavior will be emphasized. Sampling,

detection, identification, and quantification of organic compounds in the environment. Prerequisites: university-level general chemistry and organic chemistry within last four years. TuTh 3:05 – 4:20 pm LSRC A156Instructor: Stapleton

ENVIRON 847S Seminar in Toxicology - See PHARM 847S-01 (required class for certificate). A weekly research seminar throughout the year is required of participants in the Toxicology Program, but open to students in related fields as well. Students, faculty and invited national speakers present their latest research findings concerning neurotoxicology, molecular biology, teratology, environmental toxicology, public policy of environmental regulation and related fields. *F 12N-1:30 pm; Levin; LSRC A247; 1 Unit.*

PHARM 533 Essentials of Pharmacology and Toxicology - (required) See PHARM 533

PHARM 554 Mammalian Toxicology - See PHARM 554

MEDICAL PHYSICS

http://medicalphysics.duke.edu

MEDPHY 500 Radiation Physics - A course covering the basics of ionizing and non-ionizing radiation, atomic and nuclear structure, basic nuclear and atomic physics, radioactive decay, interaction of radiation with matter, and radiation detection and dosimetry. *MW 10:05-11:20 am; Gunasingha; 1032 Hock Plaza; 3 Units.*

MEDPHY 505 Anatomy and Physiology for Medical Physicists - A course focused on medical terminology, biochemistry pertaining to MP, basic Anatomy and physiology, elementary tumor and cancer biology, and overview of disease in general. Upon completion, the student should: (a) understand anatomic structures, their relationships, their cross-sectional and planar projections, and how they are modified by attenuation and artifacts in the final images; (b) understand the physiology underlying radionuclide images, (c) understand how (a) – (b) are modified by disease, (d) identify anatomical entities in medical images (different modalities), and (e).identify basic disease features in medical images (e.g., Pneumothorax in chest radiographs, microcalcoifications in mammograms). *MW 8:30 – 9:45 am; Reiman; 1032 Hock Plaza, 3 units*

MEDPHY 530A Modern Medical Diagnostic Imaging System - A course describing basics of imaging science, x-ray imaging modalities including basic principles, detectors, scattered radiation, planar imaging, CT, fluoroscopic imaging, nuclear medicine imaging, US and MRI, and computers in imaging. *TuThu 10:05-11:20 am; MacFall; 1032 Hock Plaza; 3 Units.*

MEDPHY 722 Advanced Photon Beam Radiation Therapy. This course will cover the physics and clinical application of advanced external beam photon therapies with special emphasis on IMRT. Prerequisite: MP 220*. Tu Thu 8:30am – 9:45 am,* Das*; 1032 Hock Plaza*, 3 units

MEDPHY 726 Practicum on Monte Carlo method in Medical Physics - This course focuses on the fundamentals of Monte-Carlo simulations and provides hands-on experience with clinical Monte-Carlo codes used in medical dosimetry. The course will introduce software such as MCNP, EGS, FLUKA, GEANT and Penelope and companion data analysis software ROOT, PAW and CERNLIB. Students will study at least one major code and will perform two or more projects based on a clinically relevant task. Prerequisites: Calculus, modern physics, and programming. Knowledge of C, C++, or Fortran would be a plus. *Th 1:15–4:05 pm, Gunasingha, 1-3 Units.*

MEDPHY 728 Clinical Practicum and Shadowing (Radiation Therapy) - The course gives hands on experience in practical aspects of medical physics as applied to radiation therapy. Special emphasis is given to the operation of various therapy units and dose measuring devices, techniques of measuring the characteristics of radiation beams, commissioning and quality assurance checks for radiation producing devices in the clinic. The course includes shadowing a clinician, technologist, or physicist, while performing their routine clinical tasks. *W 5-8 pm; Z. Wang, J. Wu; South H.; 3 Units.*

MEDPHY 731 Advanced Medical Imaging Physics - The course includes advanced topics in diagnostic imaging including linear system theory, image quality metrology, digital radiography and mammography, new advances on three-dimensional imaging modalities, MRI, CT, ultrasound, and evaluation of diagnostic imaging methods. Prerequisite: MEDPHY 230. *TuThu 11:40 am – 12:55 pm; Dobbins; 1032 Hock Plaza; 3 Units.*

MEDPHY 748 Clinical Practicum and Shadowing (Nuclear Medicine) - The course gives hands on experience in clinical nuclear medicine. Students will work with gamma cameras, PET systems, surgical probes, dose calibrators, technetium generators, well counters to learn operation principles, calibration, and quality control methods. Students will spend time in the PET facility, nuclear cardiology, nuclear medicine, and the radiopharmacy. The course includes shadowing a clinician, technologist, or physicist, while performing their routine clinical tasks. *Tu 1:15-4:05 pm; Turkington; South H; 3 Units.*

MOLECULAR CANCER BIOLOGY

http://cancerbio.mc.duke.edu/

MOLCAN 780 (PHARM 780) Advances in Cancer Research - [Student Seminar] A presentation and discussion course in which program faculty and graduate students review the recent progress in areas of cancer research being investigated at Duke University. Provides an important avenue for evaluation and feedback for graduate student research and is required each year for all students pursuing their Ph.D. degree in molecular cancer biology. *Th 4:20-5:30 pm; Thiele and Wang; C144 LSRC; 2 Units*

MOLCAN 818 (PHARM 818) Molecular Mechanisms of Oncogenesis - This course is a lecture presentation and discussion course on the molecular mechanisms underlying cancer development in which students complete periodic tests, present a paper, and work in a group to write and defend a grant proposal. The objective of the course is to provide an opportunity for in-depth discussions of molecular mechanisms underlying the development of human cancers. The course is intended for second-year students who have already taken the course of Cell Signaling. *TuTh 10:05-11:20 am; Counter and Yao; C335 LSRC; 2 Units*

MOLECULAR GENETICS & MICROBIOLOGY

http://mgm.duke.edu

MGM 702 Papers and Grant Writing Workshop [Scientific Writing] – Introduction to grant and fellowship writing; writing assignment of two proposal topics; evaluation and critique of proposal by fellow students. *MWF 8:45–9:45 am; 001 MSRB1; Marchuk; 3 Units (crosslisted with UPGEN 702 Writing Grant Proposals)*

MGM 703 Advanced Topics in Infection Biology – This course will be a literature based course taught by 3-4 faculty on emerging themes in host pathogens. The class size will be limited to approximately 6 and the main concept is to highlight research that is paradigm changing. Class meets two times per week. *TuTh 10:05-11:20 am; Coers; 0040 CARL, 3 units*

MGM 720 Computational Tools in Next Generation Genomic Analysis – NEW Fall 2015 – This course is an intensive, one semester course in computer skills necessary to carry out analysis of next generation genomic data. The philosophy for this course is that we are training PhD students, and they should have a fairly in-depth understanding of how this analysis is carried out. This course offers that understanding. The course will involve only a small amount of lecture, and be primarily a hands-on laboratory with extensive discussion. Permission number from Instructor required for registration. Class size is limited to 6 students. TuTh 1:25-2:40pm and lab of 3:05-4:20pm; Dietrich; 289 CARL, 3 units

MGM 778 (CMB, UPGEN 778) - Genetic Approaches to the Solution of Biological Problems – See UPGEN 778

NEUROBIOLOGY

http://www.neuro.duke.edu

NEUROBIO 719 Concepts in Neuroscience I: Cellular and Molecular Neurobiology - The goal of this course is to introduce graduate students to the basic principles underlying neuronal signaling. The first part of the course will explore the generation and propagation of neuronal electrical signals and the second part will consider synaptic signaling and plasticity. An interactive discussion-based format focused on key discoveries in these areas of research, including analysis of original papers, will allow students to learn how the brain encodes, transmits, and stores information. Start date Sept 9; *M W 8:30 am-12:00 pm; West; 301 Bryan Research; 3 Units.*

NEUROBIO 733.01 (CMB, PHARM 733.01) Experimental Design and Biostatistics for Basic Biomedical Scientists - See PHARM 733.01

NEUROBIO 733.02 (CMB, PHARM 733.02) Experimental Design and Biostatistics for Basic Biomedical Scientists - See PHARM 733.02

NEUROBIO 733.03 (CMB, PHARM 733.03) Experimental Design and Biostatistics for Basic Biomedical Scientists - See PHARM 733.03

NEUROBIO 751 (NEUROSCI 751) Neuroscience Boot Camp - Neuroscience Bootcamp is a two week immersive lecture, discussion and laboratory course for graduate students in the Neurobiology Graduate Program and the Cognitive Neuroscience Admitting Program, and graduate students in allied programs at the discretion of the instructors. The Duke Neuroscience Bootcamp is designed to (1) provide a common knowledge base of neuroscience fundamentals; (2) demystify the tools of the discipline - providing hands-on experience with techniques that are commonly used to explore cellular/molecular, circuits and cognitive neuroscience. Instructor: olgeliPlatt, Mooney. *Permission number from Instructor required for registration. August 24-Sept 4, MTWThF; varies but approx. 9:00am-7:00pm; R. Mooney, M. Platt; 301* Bryan Research Building; *2 Units.*

NEUROBIO 759S (PSY 759S, PHIL 753S) Principles in Cognitive Neuroscience I- Introduction to the cognitive neuroscience of emotion, social cognition, executive function, development, and consciousness. Topics also include cognitive disorders, and computer modeling. Highlights current theories, methodological advances, and controversies. Students evaluate and synthesize findings across a variety of research techniques. Consent of instructor required. *T Th 1:25-2:55 pm; Labar; B240 LSRC; 3 Units.*

NEUROBIO 793 Research in Neurobiology - This course acquaints students with research in neuroscience and allows them to become proficient in a variety of techniques. It is an

independent study in one of the laboratories of the training faculty. Students are expected to do three rotations in three semesters. *(Laboratory Rotations) (up to 12 Units)*

NEUROSCIENCE

http://www.dibs.duke.edu/education/graduate

NEUROBIO 751 (NEUROSCI 751) Neuroscience Boot Camp - Neuroscience Bootcamp is a two week immersive lecture, discussion and laboratory course for graduate students in the Neurobiology Graduate Program and the Cognitive Neuroscience Admitting Program, and graduate students in allied programs at the discretion of the instructors. The Duke Neuroscience Bootcamp is designed to (1) provide a common knowledge base of neuroscience fundamentals; (2) demystify the tools of the discipline - providing hands-on experience with techniques that are commonly used to explore cellular/molecular, circuits and cognitive neuroscience. Instructor: Platt, Mooney. *Permission number from Instructor required for registration. August 25-September 5, MTWThF; varies but approx. 9:00am-7:00pm; R. Mooney, M. Platt; 301* Bryan Research Building; *2 Units.*

PATHOLOGY

http://pathology.mc.duke.edu

PATHOL 725 Introduction to Systemic Histology - The purpose of this course is to teach students how to identify a variety of normal tissues and cell types in standard histologic sections. Structure/function relationships will be emphasized, using an organ system approach. The scheduled class time includes both lecture and laboratory using primarily "virtual microscopy", where scanned slides are viewed on the screen of your laptop computer. This will be supplemented by examination of glass slides using a conventional optical microscope. The course is open to graduate students and advanced undergraduates and is recommended for students whose research requires examination of tissue sections. *Permission number from Instructor required for registration – contact Laura Hale. MWF 1:15-2:30 pm, Hale; M409 Davison (Duke South); 2 Units*

PHARMACOLOGY

http://pharmacology.mc.duke.edu/index2.html

PHARM 533 Essentials of Pharmacology & Toxicology - Drug absorption, distribution, excretion and metabolism. Structure and activity relationships; drug and hormone receptors and target cell responses. Consent of instructor required. *Prerequisite: introductory biology; Chemistry 151L; Mathematics 31 and 32. Instructor: Slotkin and staff, MWF 3:20-4:40 pm; C144 LSRC; 4 Units*. ***NOTE:*** **CMB Students in Pharmacology are currently required to take PHR 533 Essentials in Pharmacology & Toxicology**

PHARM 554 Mammalian Toxicology - Principles of toxicology as related to humans. Emphasis on the molecular basis for toxicity of chemical and toxicokinetics, toxicologic evaluation, toxic agents, target organs, toxic effects, environmental toxicity, management of poisoning, epidemiology, risk assessment, and regulatory toxicology, *Prerequisite: introductory biology, and Chemistry 151L, or consent of instructor. Instructor: Abou Donia; TuTh 1:25-3:00pm; LSRC C144; 4 Units.*

PHARM 733.01 (CMB, NEUROBIO 733.01) Experimental Design and Biostatistics for Basic Biomedical Scientists - The use and importance of statistical methods in laboratory science, with an emphasis on the nuts and bolts of experimental design, hypothesis testing, and

statistical inference. Central tendency and dispersion, Gaussian and non-Gaussian distributions, parametric and nonparametric tests, uni- and multivariate designs, ANOVA and regression procedures. Student presentations in addition to formal lectures. Consent of instructor required. *T 8:30-10:15am; C144 LSRC; Slotkin (Runs concurrently with Section 733.02 & 733.03) 2 Units.*

PHARM 733.02 (CMB, NEUROBIO 733.02) Experimental Design and Biostatistics for Basic Biomedical Scientists - The use and importance of statistical methods in laboratory science, with an emphasis on the nuts and bolts of experimental design, hypothesis testing, and statistical inference. Central tendency and dispersion, Gaussian and non-Gaussian distributions, parametric and nonparametric tests, uni- and multivariate designs, ANOVA and regression procedures. Student presentations in addition to formal lectures. Consent of instructor required. *W 8:30-10:15 am; C144 LSRC; Slotkin (Runs concurrently with Section 733.01 & 733.03) 2 Units*

PHARM 733.03 (CMB, NEUROBIO 733.03) Experimental Design and Biostatistics for Basic Biomedical Scientists - The use and importance of statistical methods in laboratory science, with an emphasis on the nuts and bolts of experimental design, hypothesis testing, and statistical inference. Central tendency and dispersion, Gaussian and non-Gaussian distributions, parametric and nonparametric tests, uni- and multivariate designs, ANOVA and regression procedures. Student presentations in addition to formal lectures. Consent of instructor required. *Th 8:30-10:15 am; C144 LSRC; Slotkin (Runs concurrently with Section 733.01 & 733.02) 2 Units*

PHARM 780 (MOLCAN 780) Advances in Cancer Research – See MOLCAN 780

PHARM 818 (MOLCAN 818) Molecular Mechanisms of Oncogenesis - See MOLCAN 818

PHARM 835 Innovations in Drug Development – Introduction to major issues in developing a drug to treat a disease in an interdisciplinary lecture-based and team-based learning environment. Translation of principles in biomedical sciences, biomedical engineering, and chemistry along with innovative approaches to develop a hypothetical drug for treating a disease of choice. Hypothetical development of model compounds, target analysis, and in vitro and in vivo models to test drug efficacy. *MW 3:05-4:20 pm; C335 LSRC; Schwartz-Bloom (Course requires one of the following (or equivalent): Pharm 533, Chem 518, or BME 577) 1 unit.*

STRUCTURAL BIOLOGY & BIOPHYSICS:

http://sbb.duke.edu

SBB 546S SBB Seminar. Required of all SBB certificate students. Each week a student presents a paper on their research. Attendance is open to all graduate students, faculty and postdoctoral students who have an interest in structural biology.

SBB 658 (BIOCHEM 658) Structural Biochemistry I - See BIOCHEM 658

SBB 659 (BIOCHEM 659) Structural Biochemistry II - See BIOCHEM 659

SBB 681 (BIOCHEM 681) Physical Biochemistry – A structure-based introduction to the role of thermodynamic driving forces in biology. An overview of experimental sources of structural and dynamic data, and a review of the fundamental concepts of thermodynamics. Both concepts are combined to achieve a structural and quantitative mechanistic understanding of allosteric regulation, and of coupled ligand binding and conformational change. Statistical thermodynamics is used to develop ensemble models of protein and nucleic acid dynamics. This treatment leads into specific

examples and general principles of how to interpret structural and dynamic information toward the purposes of other research. Instructor consent required*. TuTh, 10:05-11:20 am; Oas; 147 Nanaline Duke Bldg; 3 Units*

SBB 682T Advanced Physical Biochemistry - Transient kinetics, computational methods, multi-dimensional NMR, x-ray crystallography, thermodynamics of association. Prerequisite: Consent of instructor. *Oas; TBA; 3 Units*

UNIVERSITY PROGRAM IN GENETICS AND GENOMICS

http://upg.duke.edu

UPGEN 659 / BIOCHEM 659 Structural Biochemistry II - See BIOCHEM 659

UPGEN 701 Advanced Topics in Genetics and Genomics - This course is open only to first year UPGG graduate class. Weekly discussion of current literature in genetics (Fall semester) and genomics (Spring Semester). This is course is meant to fill two objectives. The first objective is to ground each of the members of the UPGG first year class, regardless of their interest, in the two areas of focus of the program - namely, genetics and genomics. The second objective is to facilitate interactions among the diverse student body by bringing the class together once a week for discussion. *W 4:00-7:00;* Ashley-Koch; *2029 GSRB I***,** 3 units

UPGEN 711 (BIOLOGY 701) - Succeeding in Graduate School in the Biological 0Sciences- Weekly lecture and Q&A on choosing a thesis advisor, the grant proposal and scientific manuscript peer review processes, and other topics related to succeeding in graduate school. Also counts for RCR credit. Minicourse, 1st half-semester. *W 12:00-1:00PM; Noor; LSRC A247; 0.5 Units*

UPGEN 712 (BIOLOGY 702) - Succeeding Beyond Grad School: Career Options with a PhD in the Biological Sciences - Weekly lecture and Q&A on alternative careers in the biological sciences, preparing job applications, and other topics related to succeeding beyond graduate school. Also counts for RCR credit. Minicourse, 2nd half-semester. *W 12:00-1:00PM; Noor; LSRC A247; 0.5 Units*

UPGEN 702 Scientific Writing (Writing Grant Proposals) - This course is for students interested in learning tools for writing grant proposals. (Same Class Content as MGM 702 Scientific Writing) *MWF 8:45 -9:35 am; 001 MSRB I; Marchuk; 3 units*

UPGEN 716 Genetics Student Research - Presentations by genetics students on their current research. Required course for all graduate students specializing in genetics. Credit grading only. *F 4:00-5:30 pm; MacAlpineHorner 001 MSRB I; 1 Unit*

UPGEN 750 Genetics Colloquium - Lectures, discussion sections, and seminars on selected topics of current interest in genetics. Required of all students specializing in genetics. *Tu 12:30-1:30;* Ashley-Koch*; 147 Nanaline Duke Bldg; 1 Unit*

UPGEN 778 Genetic Approaches to the Solution of Biological Problems (MGM/CMB 778) - Offers 24 focus areas covering a wealth of genetics and genomics areas, that include 3 broad categories: I - Quantitative Genetics and Genomics, II - Model Organism Genetics and Genomics, and III - Topics in Genetics and Genomics (III). A module consists of six classes and students select a sequence of six consecutive modules. There are 6 sessions containing three modules. Students choose one module per session. *MWF 2:00-3:30 pm; Haase; please visit the UPGG website at http://upg.duke.edu/ for a listing of class locations; 4 Units*