UAB GRADUATE BIOMEDICAL SCIENCES

Knowledge that will change your world

GRADUATE BIOMEDICAL SCIENCES

COURSE CATALOG

2017-2018

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GBS Required Courses

GBS 707. Basic Biochemistry & Metabolism. 2 Hours.
This course is intended to provide students a rigorous background in the principles of biological chemistry. The principles taught are those we believe student should master and include the application of these principles to research protocols and performance. Required of all first year GBS students. *Fall Semester | Primary Instructor: Scott Ballinger | Instructor: Shannon Bailey.*

GBS 708. Basic Genetics and Molecular Biology. 2 Hours.
This course is intended to provide students with a strong foundation in basic genetics and basic molecular biology so that students are able to apply and understand fundamentals in their lab research. Required of all first year GBS students. *Fall Semester | Primary Instructor: David Schneider.*

GBS 709. Basic Biological Organization. 2 Hours.
This course is intended to provide students with exposure to the fundamentals of basic cell biology and begin to build a foundation of knowledge that will be needed as the student progress along the scientific path. Required of all first year GBS students. *Fall Semester | Primary Instructor: Zsuzsanna Bebok | Instructor: Elizabeth Sztul.*

GRD 717. Principles of Scientific Integrity. 3 Hours.
This course is blended with web based CITI RCR modules and an in-person 8 hr workshop. Required of all GBS students. *Fall and Spring Semester | Primary Instructor: Lisa Schwiebert*

GBSC 731. Intro to Biostats. 2 Hours.
This course is intended to provide graduate students with an introduction to biostatistics. The emphasis in this course will be upon understanding statistical concepts and applying and interpreting tests of statistical inference. Content will include but not be limited to: choosing the correct test for a given research design, data and data files, data screening, scaling, visual representations of data, descriptive statistics, correlation and simple regression, sampling distributions, and the assumptions associated with and the application of selected inferential statistical procedures (including t-tests, Chi-square, and ANOVA). Computer software (SPSS) will be employed to assist in the analysis of data for this course. Students should have access to a computer, SPSS software, and the Internet. *Summer Semester | Primary Instructor: Karen Gamble*

Lab Rotations and Non-dissertation/Dissertation Hours

GBS 794. Lab Rotation 4. 1-9 Hours.
Rotation for students needing a fourth rotation, usually in the Spring or Summer Semester. *Primary Instructor: David Schneider*

GBS 795. Lab Rotation 1. 1-9 Hours.
First rotation for first year GBS Theme students. *Primary Instructor: David Schneider*

GBS 796. Lab Rotation 2. 1-9 Hours.
Second rotation for first year GBS Theme students. *Primary Instructor: David Schneider*

GBS 797. Lab Rotation 3. 1-9 Hours.
Third rotation for first year GBS Theme students. *Primary Instructor: David Schneider*

GBS 798. Non-dissertation Research Hours. 1-12 Hours.
Lab hours for students in the GBS Theme who have not entered candidacy. *Primary Instructor: David Schneider*

GBS 799. Dissertation Research Hours. 1-12 Hours.
Lab hours for students in the GBS Theme who have entered candidacy. *Primary Instructor: David Schneider*

Theme Module Courses

January Modules

GBS 710. Cell Signaling. 2 Hours.
This course covers major extracellular and intracellular signal transduction cascades that regulate animal development and physiology. Topics include the mitogen activated protein kinase cascade, transforming growth factor beta, insulin, and cytokines. *This course required for first year students in CANB and NESC themes and recommended for the CMDB theme. Spring Semester | January Module | Primary Instructor: Michael Miller.*

GBS 724. Principles of Human Genetics. 2 Hours.
Course required for first year GGB students and is offered to upper-level students as an advanced course. Course will cover recessive, dominant, X-linked, and mitochondrial inheritance, as well as basic cytogenetics, and chromosome abnormalities. *Spring Semester | January Module | Primary Instructor: Fady Mikhail.*

GBS 740A. Intro to Immunology-Part 1. 2 Hours.
Introductory Immunology is a team-taught survey course that covers basic concepts of innate and adaptive immunity. These integrated series of lectures provide a firm foundation in immunology, especially for those with minimal immunology background, and serve as an important refresher for the developing immunologist. Parts 1 and 2 are offered Spring Semester. Must take both to receive grade. Required of all first year Immunology Theme students. *Spring Semester | January | Primary Instructor: Louis Justement | Instructor: Peter Burrows*

GBS 750. Nerves, Muscles and Bones. 2 Hours.
This course will include an overview of basic cellular physiology and the neurological and musculoskeletal systems. Neurologic and neuromuscular diseases such as Parkinson's, multiple sclerosis, and myasthenia gravis will be discussed, along with primary myopathies (e.g., dystrophinopathies), joint diseases (osteoarthritis, acute arthritis, arthropathies, fibrosing disorders), and bone diseases (osteoporosis, osteopetrosis, osteonecrosis). *Spring Semester | January Module | Primary Instructor: Glenn Rowe.*

GBS 760. Prokaryotic Genetics and Molecular Biology. 2 Hours.
This course is designed to familiarize students with advanced knowledge in recombination, transcription, translation, regulation of gene expression, transport mechanisms and protein export. The students will learn the fundamental principles how structural components of bacterial cells are built and how bacteria-specific metabolic pathways can be exploited by antibiotics. We will also cover state-of-the-art technologies such as whole genome sequencing, microarray experiments, methods to analyze protein-protein interactions and the metabolome of bacteria. In this course, we emphasize the training of critical thinking and foster the ability of the students to design their own experiments to solve scientific problems in bacteriology. The goal of the course is to provide a strong foundation for advanced bacteriology classes and for doing research in any bacteriology lab. *Spring Semester | January Module | Primary Instructor: Michael Niederweis.*

GBS 781. Molecular Enzymology. 2 Hours.
Course intends to touch on the various mechanisms of enzymes in biological systems. Course required for first year BSB Theme students. *Spring Semester | January Module | Primary Instructor: Kiril Popov.*

February Modules

GBS 712. Cellular and Molecular Aspects of Developmental Biology. 2 Hours.
The goal of this course is to provide an introduction to the fundamentals of vertebrate developmental biology. The course will consist of faculty lectures and research paper discussion groups covering a broad range of developmental issues from fertilization to organogenesis. *Recommended for CMDB theme. Spring Semester | February Module | Primary Instructor: Brad Yoder.*

GBS 720. Genomic Structure and Function. 2 Hours.
This course will cover a wide variety of topics related to this topic, including genetic variation and polymorphisms, alternative splicing, microRNAs, and novel sequencing and microarray technologies. *Spring Semester | February Module | Primary Instructor: Michael Crowley*

GBS 740B. Intro to Immunology-Part 2. 2-4 Hours.
Introductory Immunology is a team-taught survey course that covers basic concepts of innate and adaptive immunity. These integrated series of lectures provide a firm foundation in immunology, especially for those with minimal immunology background, and serve as an important refresher for the developing immunologist. Parts 1 and 2 are offered Spring Semester. Must take both to receive grade. Required of all first year Immunology Theme students. *Spring Semester | February | Primary Instructor: Louis Justement | Instructor: Peter Burrows*

GBS 751. Heart, Lung and Kidney. 2 Hours.
Course will introduce the exquisitely integrated cardiovascular, respiratory, and renal systems. This integration will be reinforced with examination of numerous disease states (acidosis, hypertension, heart failure, atherosclerosis/chronic vascular inflammation, genetic and environmentally-induced pulmonary diseases, chronic kidney disease). *Spring Semester | February Module | Primary Instructor: Sabine Huke*

GBS 762. Virology. 2-3 Hours.
This course is designed to familiarize students with the general steps involved in viral lifecycles and use this knowledge as a framework for understanding the similarities and differences in the lifecycles of (+) and (-) stranded RNA viruses, DNA viruses, and retroviruses. The course also covers the role of viruses in oncogenesis, the origin and evolution of viruses, the innate immune response to viral infections, and the development of antiviral chemotherapeutics. The goal of the course is to provide a strong foundation for advanced virology classes and to provide students with enough background in virology to be comfortable teaching in a college level microbiology class. *Spring Semester | February Module | Primary Instructor: Elena Fr*
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GBS 783. RNA Biology. 2 Hours.
Course exploring the biology, biochemistry, structure and function of RNA at a research level. *Course required for first year BSB theme students. Spring Semester | February Module | Primary Instructor: David Schneider.*

GBSC 729. Cell Neurophys. 2 Hours.
This course is required for first year Neuroscience Theme students. Course presents the fundamental principles of how nerve cells work. Starting with ion channels themselves, it integrates them into the functioning of individual neurons. The way in which voltage-dependent ion channels act in concert to generate action potentials and synaptic potentials is discussed in the framework of basic physical laws. The mechanisms of transmitter release and the post synaptic actions of transmitter are studied. The overall aim is to provide students will a quantitative understanding of how individual nerve cells communicate with each other. Class meets M-F, 8am-10am, February 1-28, 2017, in Kaul 437. Canvas 01-01-2017 *Spring Semester | February Module | Primary Instructor: Jacques Wadiche*

March Modules

GBS 714. Developmental Neuroscience. 2 Hours.
The course will utilize the scientific literature and faculty lectures to cover a broad range of topics related to the mechanisms of building a brain. The topics covered range from neural induction in early development, to axonal guidance and synapse formation, to neuro-glial interactions in the adult nervous system. Grades will be based on two exams and student participation in class discussions. *Required for NESC theme and recommended for CMDB theme. Spring Semester | March Module| Primary Instructor: Gwen King*

GBS 722. Bioinformatics. 2 Hours.
This course will cover a wide variety of different bioinformatics applications, which will be taught through use of available on-line bioinformatics resources. The topics covered will include: introductions to large-scale, generic databases at NCBI, European Bioinformatics Institute, SwissProt, PDB, UniProt and Ensembl; Sequence analysis systems such as BLAST, ORF-Finder and GENSCAN, Multiple Sequence Analysis, gene identification in DNA and an introduction to the Human Genome Project; resources that are used in Microarray Data Analysis; Protein sequence analysis using Pfam, Prosite, Prints, Blocks, Protein structure analysis using SCOP, CATH; structural bioinformatics, secondary structure calculation, homology modeling, structure prediction, protein folding, protein-ligand docking and molecular dynamics. *Spring Semester | March Module | Primary Instructor: David Crossman*

GBS 744. Mucosal Immunology. 2-3 Hours.
The mucosal immune system is essentially the primary site of interaction between invading pathogens and the immune system. Mucosal immunity has always been a strength of the immunology community at UAB and is rarely covered at most other institutions. This class will provide in-depth analysis of the structural features that distinguish the mucosal immune system from the peripheral immune system. Features of innate and adaptive immunity as they relate to mucosal immune responses will also be covered. The course will involve student presentations on selected topics. *Spring Semester | March Module | Primary Instructor: Lesley Smythies | Instructor: Robin Lorenz & Laurie Harrington*

GBS 752. GI, Endocrine and Immune System. 2 Hours.
This four-week course will examine the physiology and pathobiology of the gastrointestinal tract, followed by submodules focused on endocrinology and immunology. Students will learn how the endocrine system integrates homeostasis of multiple organ systems through a comprehensive approach—influencing all systems examined in the previous modules. The mechanisms and consequences of abnormal GI function (e.g., peptic ulcer disease, diarrhea), endocrine dysregulation (type II diabetes mellitus, gigantism, hyperthyroidism, Cushing's syndrome), and immune dysfunction (HIV, rheumatoid arthritis, type I diabetes mellitus) will be discussed. The course is divided into three blocks (GI, Endocrine, & Immune)—each with a block leader. Requirement This course is designed for doctoral students admitted to the Graduate Biomedical Sciences (GBS) PhD program and is required for GBS students in the Pathobiology and Molecular Medicine (PBMM) theme. GBS students from other themes are welcomed and encouraged to take this course as an elective. Individuals outside the GBS program must contact the course director before enrolling in the course to check availability. *Spring Semester | March Module | Primary Instructor: Zdenek Hel.*

GBS 763. Microbial Pathogenesis. 2-3 Hours.
The course in Bacterial Pathogenesis contains introductory lectures that provide an overview of major concepts including virulence factors, and host immune mechanisms. Most of the lectures describe the unique aspects of specific bacterial (and fungal) pathogens. Although many of the most important medical pathogens are covered, the course focuses especially on those bacterial and fungal pathogens studies most intensively at UAB. Each week students will be given a quiz based on the lectures of the preceding week. To answer the questions, an understanding of the lecture material will be needed. The questions are designed to help the students thinking about hypotheses and concepts in Bacterial Pathogenesis. The final grade in the course will be based on these quizzes and the student participation in discussions. *Spring Semester | March Module | Primary Instructor: David Briles | Instructor: Williams Swords*

GBS 769. Carcinogenesis. 2 Hours.
This course is intended to introduce the concepts in carcinogenesis, followed by understanding the etiology, molecular events and signaling pathways involved. This is a course for students who have completed GBS 707, 708, 709. Attendance is required for this course. *Spring Semester | March Module | Primary Instructor: Rajeev Samant | Instructor: Lalita Shevde-Samant*

GBS 782. Molecular Genetics. 2 Hours.
Course studying the structure and function of genes at a molecular level. Course required for first year BSB Theme students. *Spring Semester | March Module | Primary Instructor: Peter Detloff.*

April Modules

GBS 741. Lymphocyte Biology. 2 Hours.
This is NOT an advanced course. The objective of this course is to provide first year immunology students with the opportunity to gain a more in-depth understanding of selected aspects of lymphocyte biology. Possible topics include T cell subsets, B cell biology, lymphocyte activation, and transplantation immunology. The course is literature intense, and students are required to read and present numerous scientific papers. *Spring Semester | April Module | Primary Instructor: Allan Zajac.*

GBS 753. Pharmacology and Molecular Medicine. 2 Hours.
Students taking this course will be expected to have a thorough understanding of normal and abnormal organ system function as discussed in the three-modules described above. Lectures will build on that foundation to cover recent advances in drug design and development based on approaches of molecular pharmacology and molecular medicine. In addition, drug targeting strategies that take advantage of specificity in cellular structure and cell signaling processes will also be discussed. Course meets M-F, 8am-10am, March 29-April 25, 2016. Contact course master for location. *Spring Semester | April Module | Primary Instructor: Robert van Waardenburg | Instructors: Karina Yoon, Charles Falany*

GBS 774. Cancer Immunology. 2-3 Hours.
A summary of key signaling pathways that regulate cancer cell growth, death and behavior will be presented. An intense evaluation of mechanisms involved in pro-and anti-tumor immunology will be presented along with theoretical aspects of cancer immunotherapy. *Required for first year CANB Theme Students. Spring Semester | April module | Primary Instructor: Nabiha Yusuf*

GBS 784. Stem Cell Biology. 2 Hours.
This course will explore the derivation, manipulation, and differentiation of embryonic, fetal, and adult stem cells in both mice and humans. Topics to be discussed include stem cell self-renewal, teratoma formation, hematopoietic stem cells, neural stem cells, trans-differentiation, nuclear transfer, and reproductive and therapeutic cloning. The course will be a mixture of instructor lectures and interactive journal club style presentations from the current stem cell literature by the students. Students will be evaluated based upon their journal article presentations, participation in class discussions, quizzes, and attendance. *Spring Semester | April Module | Primary Instructor: Thomas Ryan.*

GBSC 718. Epigenetics. 3 Hours.
This course introduces the fundamentals of epigenetic controls and how epigenetic regulation is being investigated and utilized in basic and translational research. Specifically, students learn of changes in gene expression or cellular phenotype caused by mechanisms other than changes in the underlying DNA sequence. Students also gain an understanding of the differences between genetic and epigenetic influences on gene expression; epigenetic mechanisms that regulate gene expression; how epigenetic modifications are propagated; and the phenotypic consequences of normal versus abnormal epigenetic regulation in disease, development, and evolution. *Summer Semester | May Module | Primary Instructor: Lizhong Wang.*

GBSC 727. Neuro Systems. 2 Hours.
This course is meant to bring all students (those who come from backgrounds in diverse fields from biology to psychology to engineering) up-to-speed on current thinking about neurobiology of the brain systems that underlie behavior. As part of this course, students will be required to read textbook information and apply that knowledge to understanding and explaining papers from the primary literature. Course is required for all first year Neuroscience Theme students. *Spring Semester | April Module | Primary Instructor: Kristina Visscher | Instructor: Robin Lester.*

May Modules

GBS 723. Model Systems for Genetic Analyses. 2 Hours.
The course will provide students with an in-depth knowledge of the different animal models used for analyses of gene function and genetic pathways. Topics include transgenic and knockout mouse technologies and strategies, large scale genetic screens in C. elegans and Drosophila, and modeling human genetic diseases in zebrafish. *Summer Semester | May Module | Primary Instructor: John Hartman*

GBS 733. Diseases of the Nervous System. 2 Hours.
Major advances have been made in understanding diseases of the nervous system at a cellular and molecular level. Several new findings have had direct therapeutic implications and have resulted in the development of novel drugs or new disease management strategies. This course intends to review the most common brain and CNS disorders. *Summer Semester | May Module | Primary Instructor: Lucas Pozzo-Miller.*

GBS 768. Communicating Science. 2 Hours.
This first year graduate level course will teach students how to make formal scientific oral presentations and how to write a paper for publication in a scientific journal. Required for Micro Theme students. Class meets in BBRB 263, M-F, 8am-10am, May 1-25, 2017. Notice that start date is before official UAB semester start. *Summer Semester | May Module | Primary Instructor: Sunnie Thompson*

GBS 770. Pathobiology of Cancer. 2 Hours.
Students will gain an understanding of the pathology of cancer in general and an appreciation of the gross, histologic and molecular pathology of cancers of multiple organs, including the brain, lungs, breast, prostate, colon, bone, bone marrow and lymph nodes. The students will learn the basis of the pathologic classification of cancers of particular organs, including the gross, microscopic and molecular features that aid in classification. Then the clinical implications (i.e., prognostication and treatment) of the classification systems will be discussed. Also, current controversies and topics of research interest may be introduced. In addition, several lectures will focus on the epidemiology of cancer and translational research in cancer, including animal models of cancer. *Summer Semester, every even year | May Module | Primary Instructor: Andra Frost | Instructor: Isam-Eldin Eltoum*

GBSC 726. Science Communication & Review. 2 Hours.
The overall goal of this course is to develop the skills required to effectively convey experimental results to an audience, review manuscripts, research proposals, and enhance scientific professional development. At the end of the course, students will be able to write a manuscript and grant review and list the important steps for submission and response to reviewers' critiques. Students will be able to detail the components of delivering an effective presentation and have experience with each common format (elevator talk, formal oral presentation, poster presentation). Required for majority of GBS first year students. *Summer Semester | May Module | Primary Instructor: Anita Hjelmeland | Instructor: Hubert Tse.*

Advanced Courses

GBS 700. Molecular Neurodegeneration. 3 Hours.
Course provides clinical exposure to the evaluation and care of patients with cognitive disorders through a combination of didactic sessions and practicum visits, including observation of visits for patients with developmental and age-related cognitive impairment, neuropsychological testing, and functional MRI. *Spring semester, even years. | Primary Instructor: Erik Roberson.*

GBS 702. You Teach Me. 3 hours.
Autoimmune Effector Mechanisms and Inflammation in Type 1 and 2 Diabetes. This course will begin with a general overview of Type 1 and 2 diabetes, but in later weeks, students are given the opportunity to teach and describe a particular cell type and/or immune effector molecule that pertains to Type 1 or 2 diabetes pathogenesis. The teaching topic is for the presenter to decide, but the course master will provide guidance and input. Does your favorite immune cell or effector molecule have a role in the pathogenesis of Type 1 or 2 diabetes? You will be surprised at what you uncover. *Spring semester. | Primary Instructor: Hubert Tse*

GBS 705. Biology of Neurodevelopmental Disorders. 3 Hours.
This course will review how normal cellular maturation, signaling, and circuitry are disrupted in a wide variety of neurodevelopmental disorders. Topics will include: Once neurons arrive in their final locations, what events occur to allow for integration into a network, plasticity of circuits (including critical periods of plasticity), and balance of excitation and inhibition? Why is the developing brain sensitive to inflammation, over-excitation, mood stabilizers (as well as antipsychotic medications and other drugs), and malnutrition? How can disruptions in neuronal maturation give rise to distinct neurodevelopmental disorders? *Fall semester, odd years | Primary Instructor: Rita Cowell.*

GBS 715. Skeletal Development and Disease. 3 Hours.
This class is designed for understanding Cellular and Molecular Signaling essential for the normal development and remodeling of skeleton and for learning genetic mechanisms associated with skeletal dieses and pathology. *Spring Semester | Even Years | Primary Instructor: Amjad Javed*

GBS 718. Graduate Histology. 3 Hours.
This course will cover the specialized cell biology and microscopic anatomy for each of the mammalian organ systems, as well as consider current research with regards to each system. The objective is to understand how cells organize into tissues and organ systems and how these systems function in the body, as well as appreciate the microscopic appearance of cells, tissues and organs. Student must have completed the first year of a graduate program and active engagement in research. *Last offered Spring 2012. Spring Semester | Even Years | Primary Instructor: Laura Cotlin.*

GBS 726. Advanced Medical Genetics. 3 Hours.
This course will focus on the medical application of advances in genetics and genomics. Topics include chromosome structure and function and major types of chromosomal abnormalities, cancer genetics and cytogenetics, inborn errors of metabolism, current strategies for detection of

mutations associated with genetic disorders, genetic risk assessment and population genetics, and genomic approaches to diagnosis and risk stratification. *Fall Semester | Primary Instructor: Jessica J Denton | Instructor: Jon D Sharer*

GBS 727. Advanced Human Genomics. 3 Hours.
This course will cover the conceptual basis, major discoveries, and unsolved problems in human genomics, with an emphasis on disease applications. The goal is to make students conversant with the structures, functions, and natural histories of human genomes, the computational and experimental methods used to establish that knowledge, the applications of genomics to medical research, and the broader impacts of genomic research on the community. Each topic will be covered by an approximately 90-minute lecture from a subject-specific PI coupled to reading of pieces of primary literature. Students will also participate in 3 student-led journal clubs in which one or more papers are discussed in detail with the help of the teaching faculty. We will also perform 3 interactive sessions to teach basic computational skills in Unix, Perl and R. Grading will be determined by: discussion interaction, computational problem sets due in weeks 4, 6, and 8, and a final project in which students perform a small but cohesive set of bioinformatic analyses to address a question of their choosing, subject to approval/discussion with the teaching faculty. Format: Each of the 7 weeks will include two, 90 minute lectures performed at UAB. In weeks 2, 4, and 6, we will convene at HudsonAlpha for four-hour sessions. Each four-hour session will include ~1 hour of paper discussion, ~1 hour of teaching on a relevant computational topic, and ~2 hours of hands-on interactive data manipulation with commonly used data types and computational tools. *Spring Semester | Even Years | Primary Instructor: Greg Cooper.*

GBS 729. Translational Approaches in Neurodegeneration. 3 Hours.
With the current emphasis on "bench to bedside" strategies, successful translational research approaches may be helpful for a productive career in academic and industrial settings. This course uses the field of neurodegeneration as a vehicle for conceptualization to the failures, current challenges, and successes of different translational approaches. This course emphasizes active learning principles by placing students into scenarios of direct relevance to a career in science (e.g., emulation of study section discourse, formal critical debate that happens at international symposia, and informal discussions between colleagues). *Spring Semester | Primary Instructor: Andy West.*

GBS 730. Intro to Neurobiology. 3 Hours.
Hands on experiments and classroom lectures onsite at the Dauphin Island Sea Lab. Students live onsite the entire course. Required of first year Neuroscience Theme students; others must obtain permission from the Neuroscience Theme directors. Course actually begins in July, before Fall semester. *Fall Semester | Primary Instructor: Christianne Strang | Instructor: Kent Keyser*

GBS 739. Neuropharmacology. 3 Hours.
Advanced course which will focus on the mechanism of action of CNS-active drugs. The first one-third of the course will consist of lectures that emphasize basic principles of neuropharmacology including neurotransmitter and receptor concepts, pharmacokinetics, pharmacodynamics and pharmacogenomics. The next two-thirds of the course will focus on the mechanism of action of different drug classes, including classical behavioral and biochemical studies, as well as genetic and molecular analyses of drug action. In each section, the instructor will give an overview lecture followed by student presentations. Student performance will be evaluated based on homework, oral presentation and written examination. *Fall Semester, even years | Primary Instructor: Qin Wang*

GBS 748. SpTp Courses. 3 Hours.

GBS 748.VT. Adv Tpc Bacterial Pathogenesis. 3 hours.
The Advanced Topics in Bacterial Pathogenesis course provides a detailed examination of major concepts related to host-pathogen interactions. Its primary focus will be the molecular mechanisms responsible for subversion of host defense by pathogenic bacteria. Select topics will be covered in two parts on different dates: 1) a general presentation by expert faculty on Wednesday, 2) student presentations on assigned subtopics in form of a 10-15 minute PowerPoint presentation and handout the following Monday. The final grade in the course will be based on student presentations, handouts, and participation in discussions. Time may change, once class begins, if ALL are in agreement. *Offered Fall 2017. Fall semester | Primary Instructor: Carlos Orihuela*

GBS 748.VTC Fund of Renal Physiology. 3 hours.
Fundamentals of renal physiology is designed to provide detailed understanding of renal physiology through a series of lectures, histology analyses, small group discussion, workshop based study problems, and simulations. Experts in kidney physiology will give lectures, to establish a foundation in renal physiology. This will be coupled with activities for hands-on application of the principles taught in the lectures. *Offered Fall 2017. Fall semester | Primary Instructor: Kelly Hyndman*

GBS 749. Mitochondria in Health, Disease, & Toxicology. 3 hours.
This course will consistent of in-depth discussions and lectures on specific topics in the field of mitochondrial biology. Students will gain a solid understanding of mitochondrial biology in normal physiology as well as the importance of mitochondrial dysfunction in various human diseases and toxicological responses. Prerequisite: Successful completion of a doctoral level biochemistry/molecular/cell biology course. *Last offered Spring 2016. Spring Semester | Primary Instructor: Shannon Bailey.*

GBS 754. Autophagy in Disease and Medicine. 3 Hours.
This course reviews the pathobiology of autophagy and how it is essential for survival, differentiation, development, and homeostasis and how it serves an adaptive role to protect organisms against diverse pathologies, including infections, cancer, neurodegeneration, aging, and heart disease. *Fall Semester | Primary Instructor: Jianhua Zhang.*

GBS 757. Biology of Disease. 3 Hours.
Biology of Disease is a comprehensive course in general pathophysiology designed for graduate students in the GBS program or other science related graduate programs. This course will begin with an overview of general anatomy and histology and then will investigate basic pathophysiologic principles emphasizing pathogenic mechanisms and clinically important diseases where current research areas will be highlighted. The biomedical science students will learn the mechanisms involved in disease processes and will develop an understanding of diseases and clinical medicine to help them converse knowledgeably with medical colleagues and target their research towards clinically relevant issues. Requirements: It is expected, although not required, that students will have a background in biochemistry, cell biology, microbiology, and immunology and will have successfully completed the first year GBS courses. Also PAT 700. *Fall Semester / Primary Instructor: Peter Anderson.*

GBS 765. Hybrid Structural Techniques as Applied to Cellular & Molecular Biology. 3 Hours.
This course will focus on the use of X-ray crystallography, Cryo-Electron microscopy and Image Reconstruction, NMR, and Mass Spectrometry to obtain structures of biological macromolecules. Each component will be taught separately. Each module will focus on insuring the student has a basic understanding of the essential principles of the technique and its practical application. Examples will generally be drawn virology and immunology. Students will be actively involved through assigned problem sets and in class discussion. This material in this course will be targeted towards second year graduate students and non-specialists. *Fall, even years | Primary Instructor: Terje Dokland | Instructors: Peter Prevelige, Jamil Saad, Mark Walter.*

GBS 775. Cancer Treatment. 3 Hours.
Students will study current theories regarding chemotherapy, radiation therapy, chemoprevention and imaging. Students will also be exposed to state-of-the-art for each of these treatment/diagnostic modalities. This course uses a combination of textbook and literature readings and classroom discussions to provide students with an understanding of the different classes of drugs used to treat cancer. The course focuses on the mechanisms of drug action, the basis for selectivity and therapeutic applications. Traditional as well as novel approaches to therapeutics will be discussed, as well as the role of drug resistance and strategies for its management. *Spring Semester, even years | Primary Instructor: Karina Yoon | Instructor: Chris Willey.*

GBS 778. Cancer Metastasis. 3 Hours.
The majority of cancer associated deaths are due to complications arising from metastatic disease. The process of metastasis is highly selective and is the result of a tumor cell completing a series of complex interrelated steps. Despite our improved knowledge of this disease, we still do not fully understand the molecular mechanisms regulating tumor progression and metastasis. This advanced course will cover basic mechanisms of how a tumor cell progresses from growth at the primary site to forming an overt lesion in a secondary organ and techniques used to study this disease. *Spring Semester, odd years | Primary Instructor: Doug Hurst*

GBS 779. Translational Research in Cancer. 3 Hours.
This course covers topics on patient-based research efforts that may be important adjuncts to basic science studies. Topics include tissue collection, ex vivo assays, animal models, high-throughput arrays, drug development, epidemiologic studies, basics of clinical trials, and other topics. *Fall Semester, odd years | Primary Instructor: Eddy Yang.*

GBS 787. SpTp Courses. 3 hours.

GBS 788. SpTp Courses. 3 hours.

GBSC 703. Bioinformatics Courses. 3 hours.

GBSC 703.01A. CB2-101 Intro to Scientific Computing. 3 hours.
The purpose of this course is to provide and introduction to main computational skills required for scientific computing. Specifically, the participants are exposed to practical use of standard web available resources and computational tools for the managing molecular biology data. A successful participation includes the development of scripts and programs for analyzing largescale data. *Fall Semester | Primary Instructor: Malay Basu.*

GBSC 703.01D. Biomed Informatics Research. 3 hours.
Biomedical informatics is the art and science of collection, representation and analysis of information for the purpose of improving human health. Informatics applications span the spectrum from molecular (bioinformatics) to organism (clinical informatics). This course

will examine the scientific field that underlies the development of tools and methods applied to the biomedical domain. The course will include lectures, readings from a textbook and journal papers, a term paper reviewing some area of informatics research, and a final examination. It is intended for students who are studying applied areas of informatics (including Health Informatics and Nursing Informatics) as well as students who would like to explore the possibility of an informatics research career. *Spring Semester | Primary Instructor: James Cimino*

GBSC 703.01E. CB2-201. Computational Biology & Bioinformatics. 3 hours.
This course will be a 10 days (3 GBS credits) hands on course of 4 hours training each day in Computational Biology and Bioinformatics. Detailed program of the course will be available at http://cmb.path.uab.edu/training/cb2-201.html. *For students without solid programming experience attendance of CB2-101 is mandatory before taking this course. *Spring Semester | Primary Instructor: Malay Basu.*

GBSC 705. Protein Mass Spectrometry. 3 Hours.
Students participating in this course become familiar with standard analysis of proteins and protein mixtures by analytical mass spectrometry. This includes the analysis of recombinant and native isolations of proteins including the analysis of post translational modifications. The first month of the course will focus on the fundamentals of mass spectrometry and protein analysis and will be open to first year students. The second and third months of the course is followed by an applications section for students who have completed their first year course requirements. Included topics throughout the course include, sample preparation, mass spectrometry instrumentation, mass spectral interpretation, proteomic experimentation, database searching, analysis of protein modifications, targeted analysis of proteins in complex mixtures, and structural techniques in mass spectrometry. *Spring Semester | Primary Instructor: Matt Renfrow.*

GBSC 706. NMR Spectroscopy. 3 Hours.
The main purpose of this course is to provide fundamental understanding (physics) to graduate students who want to utilize NMR spectroscopy as a major tool in their structural biology research. Students with elementary Quantum Mechanics background will gain the optimum benefit from this course. The course is offered every two years. This course covers basic NMR Theory and Concepts (Nuclear Spin-1/2, Bloch Equations, FT-NMR, Rotating Frame, Various Relaxation Mechanisms, Chemical shits, J couplings, etc.), Density Matrix Theory, Product Operator Description of 2D- and 3D-NMR, Nuclear Overhauser Effect, Conformational Exchange, Solomon-McConnel equations, Residual Dipolar Couplings, NMR spectra of Amino acids, Peptides and Proteins, Solvent Suppression Methods, Random Coil Chemical shifts, 2D-NMR methods for assignments and structure calculations of peptides and small proteins, 3D/4D-NMR methods for assignment and structure studies of large proteins, CYANA Structure-Refinement calculations, NMR of nucleic acids, Protein Dynamics, and study of Protein-Ligand complexes including applications in drug design (STD-NMR, trNOESY, SAR-by-NMR and ILOE). *Spring Semester, even years | Primary Instructor: William J Placzek | Instructor: Chad Petit.*

GBSC 707. Metabolic Regulation of Gene Expression. 3 Hours.
This course will focus on the impact of various metabolites on gene expression, cell growth, and differentiation in health and disease. The key topics for discussion will include the types of biologically active molecules in mammalian tissues, the mechanisms that regulate their concentrations at different stages of life, and the mechanisms by which these bioactive molecules regulate gene transcription through binding to nuclear receptors/transcription factors. Primary literature applicable to these topics will be the basis for discussion. Each section on a specific type of signaling molecule will start with an introductory lecture, followed by student presentations focusing on various aspects of the topic. The goal of this course is to familiarize students with the mechanisms of action and diversity of bioactive metabolic compounds that directly affect the expression of proteins at the level of gene transcription as well as mRNA translation during development and in adulthood. *Spring Semester | Primary Instructor: Natalia Kedishvili.*

GBSC 708. Protein Purification & Characterization. 4 Hours.
Protein purification is the process of isolating a single type of protein or protein complex from mixture. It is critical for further characterization of protein function and structure. This course covers currently used approaches for protein purification and characterization. The format will integrate classroom lecture with demonstration. The goal of this course is to equip students with the fundamental knowledge needed to work with proteins. *Spring Semester | last offered Spring 2015 | Primary Instructor: Chad Petit | Instructor: Hengbin Wang.*

GBSC 709. Advanced Stem Cell Biology & Regenerative Medicine. 4 Hours.
Patient-specific cell therapies promise to transform medicine in the next two decades. In order for these regenerative therapies to be safe and effective, basic mechanisms of stem cell biology must be better understood. The goal of this course is to provide students with the basic science foundation to contribute to this field and to provide examples of translating this information to next generation medical therapies. *Fall Semester | Primary Instructor: Thomas M. Ryan | Instructor: Kejin Hu*

GBSC 710. Advanced Chromatin Biology. 3 Hours.
Chromatin biology may hold the keys for discovery of novel cures for cancer and other chronic genetic diseases. Chromatin state directly influences the development of regenerative medicine. Over the last few years, there has been an explosion of new insights into chromatin biology. This course will focus on four key topics: chromatin structure and gene regulation, chromatin in cancer biology, chromatin in developmental biology, and practical approaches in chromatin research. Special emphasis will be on the molecular mechanisms and biochemical approaches. The format will be 1/2 lecture and 1/3 student presentations. Primary literature related to these topics will be assigned for discussion. The goal of this course is to help students to understand the cutting edge knowledge in chromatin biology and to be able to address questions on chromatin in their own research. *Fall Semester | Primary Instructor: Xinyang Zhao | Instructor: Hao Jiang.*

GBSC 712. Evolution of Immunity. 3 Hours.
Every form of multicellular life on earth has the capacity to carry out host defense. In higher order vertebrates the necessity for immunity against pathogens has given rise to an elaborate and complex system that involves a variety of specialized cell types and effector molecules. How did this complex system evolve? This course will explore immunity across the animal kingdom with a special emphasis on points of convergent and divergent evolution of immune mechanisms and strategies. *Fall semester | Primary Instructor: Rodney G. King.*

GBSC 715. Molecular Basis of Disease. 3 Hours.
This is an advanced, graduate course that explores the molecular and cellular mechanisms that underlie the causes, symptoms, and complications of various diseases, including diabetes, autoimmune diseases, atherosclerosis, and cancer. An integrative approach to the clinical, pathologic, biochemical, and molecular perspectives of diseases is introduced. This will help the students to understand how metabolic pathways, cell cycle regulation, signal transduction, transcription factors, and protein glycosylation impacts on our ability to understand and treat human disease. Requirement: This course is designed for graduate students admitted to campus-wide PhD programs in the biomedical and basic sciences, post-doctoral fellows, medical students, residents, staff, and members of the faculty interested in the latest advances and approaches in understanding and treating human disease. Prerequisite: Successful completion of doctoral level biochemistry/molecular biology course. Individuals may contact the Primary Instructor before enrolling in the course. *Spring Semester | Primary Instructor: Yabing Chen.*

GBSC 717. Protein/DNA Xray Crystallography. 3 Hours.
Xray crystallography is an important technique to resolve protein/DNA structures and it requires specialized training. Covered in this will not only be the theoretical aspects, but there will also be hands-on training sessions on each topic. Some topics covered: protein crystallization, data collection and reduction, structure solution, refinement and how to report structures. *Fall Semester | Primary Instructor: Todd Green | Instructor: Champion Deivanayagan.*

GBSC 721. Brain Tumor Biology. 3 Hours.
Brain Tumor Signaling, Biology & Therapeutics Course. This course will review the types of adult and pediatric brain tumors with a focus on 3 major components: 1-cellular genetics and signaling, 2-pro-tumorigenic cellular biology, and 3-preclinical models and clinical treatments. AT the end of the course, the student should have a thorough understanding of the changes in tumor vs. normal tissue that promote cancer initiation and growth. The student should understand how these changes provide the foundation for current and cutting edge treatment strategies. The focus will be on gliomas, but other tumors will be discussed. *Fall Semester / Primary Instructor: Anita Hjelmeland.*

GBSC 722. Special Topics.

Section VT1. Viral Oncology. 3 Hours.
Fall Semester / Primary Instructor: Nilam Banerjee

Section VT3. SpTp: Bioenergetics. 3 Hours.
Fall Semester / Primary Instructor: Gabriel Elgavish

GBSC 724. Metabolomics. 3 Hours.
The goal of the course is to provide training on (1) the new vision of the chemical composition of the metabolome, (2) its impact on phenotypes in normal health and disease, (3) how to design experiments that (a) reduce systematic variation and (b) deal with the effects of the microbiome, (4) recovery of the metabolome from body fluids/excreta, cells and tissues, (5) analytical methods used in metabolomics, (6) post-acquisition data processing and univariate and multivariate statistical analysis, (7) metabolite confirmation, (8) unknown (new) metabolite identification, (9) pathway analysis, (10) targeted quantitative analysis of specific pathways, (11) use of stable-isotopically labeled precursors to measure pathway dynamics, (12) metabolomics in human and animal models of disease (atherosclerosis, cancer, diabetes, eye diseases, immune diseases and neurodegeneration), (13) metabolomics in situ (imaging mass spectrometry and direct analysis in the clinic and the operating room) and (14) integration of metabolomics with other Omics (genomics, transcriptomics and proteomics). *Spring Semester | Primary Instructor: Stephen Barnes.*

GBSC 725. Cancer & Microenvironment. 3 Hours.
The growth and progression of cancer is closely regulated by the tumor microenvironment. Through this course, students will gain a comprehensive understanding of the tumor microenvironment by studying topics that include, for example, the cellular and acellular composition of the microenvironment, mechanisms of communication between tumor and host cells and how the tumor microenvironment promotes tumor growth, metastasis and drug resistance. Students will also learn the in vitro and in vivo models utilized for studying the tumor microenvironment and current approaches for targeting the tumor microenvironment for cancer therapy. *Fall Semester, odd years | Primary Instructor: Yang Yang.*

GBSC 728. Cancer Genomics, Epigenetics, & Therapeutics. 3 Hours.
Recent advances in high throughput technologies have enabled researchers to decipher the genomic and epigenetic alterations in cancer in great detail. In this course, students will learn the technologies used for investigating the genomic and epigenetic alterations in cancer and effect of these changes on cancer progression and potential application of understanding these changes. The goal of this course is to provide students with an exposure to a wide range of high throughput technologies used in cancer genomic research, basic and translational genomic and epigenetics research. In addition, the course will highlight the major discoveries in the area of gene mutations and gene fusions, as well as therapeutic targeting some of the critical molecular alteration. This course will give exposures to students to state-of-the-art cancer research topics, promote scientific literacy, discussion skills, and critical research integration skills. In addition, students will also gain experience in presentation and ideas to develop new projects in cancer genomics and epigenetics research areas. *Fall Semester | Primary Instructor: Sooryanarayana Varambally.*

GBSC 730. Respiratory Tract Pathogens. 3 Hours.
This course will examine major bacterial, viral, and fungal pathogens that infect the respiratory tract in human, each using different mechanisms in attempts to evade host defenses. It will also introduce fundamental aspects of respiratory tract anatomy, lung function, and the clinical approach to patients suspected to have pneumonia. Classes will consist of an introduction to each topic provided by the faculty preceptor, followed by a critical analysis of the primary literature in the form of presentations by individual students and in-class discussion. *Fall Semester | Primary Instructor: David Chaplin | Instructor: Claude Steele.*

GBSC 734. Experimental Model Systems for Immunology Studies. 3 Hours.
This 3 credit hour advanced course is designed to help students gain in-depth knowledge and understanding of a broad range of experimental model systems used in immunology studies. All enroll students will give a brief presentation of their research projects in the beginning weeks. Then, based on the students' research interests/projects, the experimental model systems that are involved or have the potential to be involved will be identified to form specific topics for the rest of the course. *Fall Semester | Primary Instructor: Hui Hu*

GBSC 735. Discoveries in Molecular Biology. 3 Hours.
The aim of the course is to familiarize students with landmark, historical discoveries in biological research. The course will focus on seminal publications in different disciplines, predominantly but not limited to: biochemistry, cell biology and genetics. The course will be organized as student-led discussions of selected papers. In-depth analysis of the presented literature will facilitate gaining broadened knowledge of selected fields and improve capability of critically reading manuscripts. For each publication, special emphasis will be placed on examining the experimental design, interpretation of results, and organization and reporting of the findings. Classes will consist of an instructor-led introduction to the topic and presentation of a historical perspective followed by a group discussion of the paper. An important goal of the course is to help students understand and appreciate principal discoveries. Weekly meetings throughout semester. *Spring Semester | Primary Instructor: Marek Napierala | Instructors: Xinyang Zhao, Jill Butler, Tim Townes*

Advanced + Courses

The following are 2 hour advanced courses that require additional work to be approved as an Advanced Course. Students must complete an "Advanced Course Verification Form" for the following courses to be applied as advanced credit. If you have any further questions, please contact Jessica Stephenson at jstephenson@uab.edu.

GBS 758. Cardiovascular Biology. 2 Hours.
Requirement: This course is designed for doctoral students admitted to campus-wide PhD programs in the biomedical and basic sciences, post-doctoral fellows, medical students, residents, staff, and members of the faculty interested in the latest advances and approaches in cardiovascular biology. Prerequisite: Successful completion of doctoral level biochemistry/molecular biology course. Description: The course will consist of didactic lectures given by faculty members from UAB and guest lecturers from other institutions on a specific topic in the field of cardiovascular biology, which will then be followed up by student presentations of original research articles which are related to the presented subject matter and that place the discussed topic into the context of human health and disease. This format will allow for students to first gain a solid understanding of normal and pathological aspects of cardiovascular physiology, the basic experimental approaches that can be used in bench to bedside studies and the current perspectives on a broad range of current hot topics in the field. In addition, this course has unique components including instruction on how to review a research paper and prepare for an interview for an entry level position (e.g. postdoctoral) in academia and/or industry. These exercises will provide an appreciation of the issues related to a career scientific research. This course will be guided by the Course Director and other faculty members who will assist in the selection of relevant readings and facilitate in-class discussions among the students. Objectives: The primary objective of this course is for students to gain expertise in the field of cardiovascular biology through discussion and exposure to the latest research and concepts in the field with a particular focus on the translation of molecular mechanisms to our understanding of the etiology of the disease. A secondary goal is for the participant to appreciate fundamental issues and expectations for a career in academic or industrial scientific research. Prereq: Successful completion of a doctoral level biochemistry/molecular biology course (such as GBS 707) *Summer Semester, even years | Primary Instructor: Scott Ballinger.*

GBS 764. Structural Biology for Micro. 2-3 Hours.
Structural biology is central to understanding the function of biological macromolecules and is to relevant to all fields of modern biological science. This course will provide a basic introduction to the elements of structural biology including the levels of protein structure (primary, secondary, tertiary, quaternary), the basis of structure determination by X-ray crystallography, NMR, and cryo-electron microscopy, and will explore the structure/function relationships in select systems. *Spring Semester| last offered in 2014 | Primary Instructor: Peter Prevelige.*

GBS 789. Evolutionary Developmental Biology. 2 Hours.
The class is aimed at introducing the concepts of evolution and describing how changes in gene expression and function during embryonic development represent the central molecular mechanism underlying evolution. *Spring Semester | Primary Instructor: Chenbei Chang.*

GBS 790. Clinical Evaluation of Cognitive Disorders. 2 Hours.
This course will provide clinical exposure to the evaluation and care of patients with cognitive disorders through a combination of didactic sessions and practicum visits, including observation of visits for patients with developmental and age-related cognitive impairment, neuropsychological testing, and functional MRI. *Spring Semester, even years | Primary Instructor: Erik Roberson.*

GBSC 704. Practical course in cryo-electron microscopy. 2 Hours.
This is a two-week practical course in high resolution electron microscopy (EM) with emphasis on cryo-EM and the preparation and observation of frozen-hydrated particulate samples such as protein complexes, viruses and whole bacterial cells. The first week will cover some theoretical aspects and general EM theory in morning lectures, followed by practicals and demos in the afternoon. The second week will consist of independent, hands-on practical work on the Tecnai F20 cryo-electron microscope. Students have the opportunity to work on their own samples. Open to all grad students but especially to those needing cryo-EM for research. Faculty, postdocs, and technicians may also attend, if space allows. *Summer Semester | Primary Instructor: Terje Dokland.*

GBSC 714. Applications of Microscopy. 2 Hours.
This course will provide GBS students and postdoctoral fellows with an in-depth background in the theory of modern microscopy analyses for researchers in the biomedical sciences complemented wth hands-on practical exercises. The course will cover a wide range of fundamental and cutty-edge approaches with training in experimental design and technical limitations, specimen preparation, diverse uses of bright-field, simple epifluorescence, single and multiphoton confocal, high resolution, live-cell, and intravital microscopy. The course will also provide training in specialized applications such as particle tracking and co-localization, photo-activation, Ca2+ imaging, FRET, FRAP, FLIM, and TIRF, and methods for quantitative data analyses. The course will also cover image preparation for publication and ethical issues related to image manipulation. Permission from both Mentor & Primary Instructor is required to take this course. *Spring Semester |*

GBSC 729. Cellular Neurophysiology. 2 Hours.
This course is designed for first year Neuroscience students. Course presents the fundamental principles of how nerve cells work. Starting with ion channels themselves, it integrates them into the functioning of individual neurons. The way in which voltage-dependent ion channels act in concert to generate action potentials and synaptic potentials is discussed in the framework of basic physical laws. The mechanisms of transmitter release and the postsynaptic actions of transmitter are studied. The overall aim is to provide students with a quantitative understanding of how individual nerve cells communicate with each other. *Spring Semester | February Module | Primary Instructor: Jacques Wadiche.*

GBSC 732. Advanced Study of Renal Physiology. 2 Hours.
The objective of this course is to increase familiarity with classic renal physiology terminology, improve understanding of mechanisms for evaluating renal function, and to become familiar with the forefronts in research related to renal physiology and disease. *Fall Semester | Primary Instructor: David Pollock*

GBSC 733. Art of Reproducible Science. 2 Hours.
This course is open only to GBS students on a T32 grant. The goal of the Mastering the Art of Reproducible Science course is to advance the visibility and awareness of this critical issue and to equip students to better recognize and eliminate sources of irreproducible data. The course will explore the fundamental causes and consequence of data irreproducibility, discuss best-practice procedures to minimize data irreproducibility, and discuss the responsibility of the scientific community to confront the irreproducibility crisis. The course is structured around 4 month-long modules using a team-based learning strategy. *Fall Semester | Primary Instructor: Bradley Yoder*

Journal Clubs

GBS 728. Bio-Nano Technology JC. 1 Hour.
This journal club will focus on the use of biological materials as paradigms, structural scaffolds, and active elements of nanoscale materials. *Spring Semester, at PI's discretion | Primary Instructor: Peter Prevelige.*

GBS 736. Cognition Journal Club. 1 Hour.
Journal club exploring various literature on cognition and cognitive disorders. Meets Mondays at 4pm in Shelby 105. Also NBL 707. *Fall and Spring Semesters | Primary Instructor: Farah Lubin.*

GBS 746J. Exercise Medicine Journal Club. 1 Hour.
Exercise training in various forms induces a complex array of coordinated cellular and molecular processes that improve symptoms and co-morbidities associated with numerous chronic conditions including musculoskeletal, cardiorespiratory, metabolic, immunologic, and neurologic disorders—and disease risks associated with chronic physical inactivity are widespread. Understanding the biological mechanisms underlying exercise-induced adaptations and their clinical utility in disease treatment and prevention is therefore a truly interdisciplinary effort. Students will interact with scientists and clinicians from several disciplines, and will present and discuss the latest and most impactful exercise-based research in both human and animal model systems. Attendance is required. Course meets every other week. Day/Time/Location to be decided at first organizational meeting. *All Semesters / Primary Instructor: Amanda Willig*

GBS 747. JC: Hematology. 1 Hour.
This Journal Club will discuss hematology related topics including: hematopoietic stem and progenitor cells, differentiation, microenvironment, leukemia, cell signaling, and transcription factors. We will cover recent papers related to hematology/leukemia. Each week one student will supply a paper to the group to read, they are responsible for giving a brief introduction and then students will be selected at random to discuss the figures and approach. Participation by each student is required weekly with an emphasis on critical thinking, understanding methods, and discussion. Class will meet on Mondays, 2:00pm-3:30pm in WTI510E. *Fall Semester / Primary Instructor: Robert Welner*

GBS 747J. Circadian Clocks JC. 1 Hour.
In this journal club, we will bring together researchers with diverse perspectives, specialized techniques, and scientific backgrounds in order to develop a take-home message from recent circadian literature that may be applicable to all of our specific fields. Nearly all organisms possess an endogenous circadian clock that governs a wide array of rhythms, from biosynthetic to behavioral, and synchronizes (entrains) them to the 24-h environmental day-night cycle. The central circadian clock in the suprachiasmatic nucleus of the hypothalamus orchestrates rhythms in many peripheral clocks located throughout the brain and body, resulting in 24-h regulation of many physiological processes (including sleep and reproduction, metabolism, organ function, and seasonal behaviors). This regulation allows for a predictive, rather than purely reactive, homeostatic control. In humans, dysregulation of the circadian system has been implicated in some insomnias, cancers, affective disorders, and in aging and cognitive impairment. The discovery and characterization of oscillating circadian clock genes during the last decade has been largely due to cross-talk between researchers working on fruitflies and mice; this approach fueled insights into the likely design principles underlying the intracellular oscillatory machinery. Similar discussion and collaboration at a systems level of analysis may lead to new discoveries and approaches. Students will choose and present papers from any field as long as there is a circadian component to the paper. *Spring Semester | Primary Instructor: Karen Gamble.*

GBS 756. Cardiometabolic Disease Journal Club. 1 Hour.
The review of recently published articles focused on understanding the complex gene-environment interactions that contribute towards common metabolic diseases, such as obesity, diabetes, and cardiovascular disease. Articles most commonly reviewed range from the whole organism (e.g., physiology, energy balance, metabolism, endocrinology, genetics) to individual cells (e.g., cellular metabolism, signal transduction, and transcriptional regulation), in both animal models and humans. In addition, articles investigating novel lifestyle (e.g., diet and/or exercise), pharmacological (e.g., appetite suppressants), and surgical (e.g., gastric by-pass) interventions designed to treat cardiometabolic diseases are routinely discussed. *Fall Semester | Primary Instructor: Martin Young.*

GBS 766. Inflammation Journal Club. 1 Hour.
Inflammation Journal Club presents the state of the art papers that fall broadly in the area of inflammation, which include aspects of basic cellular and molecular mechanisms, animal models and immunopathology of human diseases including, infectious diseases, cancer and chronic lung diseases. *Fall and Spring Semesters | Primary Instructor: Jessy DeShane.*

GBS 776. Cancer Biology Journal Club. 1 Hour.
This journal club focuses on current topics in all areas of Cancer Biology. Each week, a student will present and discuss a recently published paper related to a selected monthly cancer theme. All students are expected to actively participate in the discussion. The goals of this course are to enhance one's ability to critically read the literature, to stay abreast of current findings, and to improve presentation skills. *Fall and Spring Semesters | Primary Instructor: Doug Hurst.*

GBS 786J. Journal Club in Structural Biology. 1 Hour.
The journal club will discuss peer-reviewed scientific articles of interest to structural biology community. In general, the majority of the articles will contain macromolecular structural data determined by one or more of the following methods: X-ray crystallography, cryo-EM, NMR and Mass Spectroscopy. It will help students become familiar with our present understanding of the structure/function for different classes of macromolecules and gain an appreciation of state-of-the-art biophysical techniques available to determine macromolecular structures. *Fall and Spring Semesters | Primary Instructor: Todd Green.*

GBS 793. Alzheimers and Frontotemporal Dementia Journal Club. 1 Hour.
Discussion of important current research on Alzheimers disease and frontotemporal dementia, with a focus on basic and translational science. *All Semesters | Primary Instructor: Erik Roberson | Instructor: Jeremy Herskowitz.*

GBSC 700. Journal Clubs. 1 Hour.

Section 01. JC- Developmental Biology. 1 Hour.
This is a journal club for GBS students focusing on Developmental Biology. Additional topics include human disorders such as cancer that involve developmental mechanisms. *Fall & Spring Semesters | Primary Instructor: Michael Miller*

Section 01A. Cancer Immunology JC. 1 Hour.
This Journal Club will meet twice a month and discuss various cancer immunology related topics including: tumor microenvironment, Toll-like receptor signaling, kinase signaling, microbiome, microRNA, Antibodies, Vaccine/Gene therapy, Innate immunity, T-cell / B-cell immunity/therapies. Format will be, faculty lecturer will present a brief 10min presentation on a specific area/discipline in cancer immunology and then a student will present an article provided by the faculty member. The intention is for the faculty member to discuss the evolution of the discipline over the years and then the article present by the student should discuss very current updates in the field. As with every journal club, discussion and debate are encouraged. *Fall & Spring Semesters | Primary Instructor: Nabiha Yusuf.*

Section 01B. JC-YstMods4HuDis. 1 Hour.
It is increasingly appreciated that human diseases are genetically complex. The power of genomic analysis varies inversely with organismal complexity. There is an increasing appreciation for evolutionary conservation of the biology underlying many disease relevant cellular processes. Thus, there is a growing opportunity to utilize simple model organisms such as S. cerevisiae (budding/bakers yeast) to understand the genetic complexity of disease processes. The journal club aims to illuminate and examine established models and to explore possibilities and new opportunities for systems genetics in yeast, in particular S. cerevisiae, to model complex biological

processes that contribute to human disease. Students wanting to enroll in this course need to email the instructor at jhartman@uab.edu for information on first class meeting and other particulars. *Fall & Spring Semesters | Primary Instructor: John Hartman.*

Section 01C. Tissue Injury & Repair JC. 1 Hour.
Tissue Injury and Repair Course. This course will provide a basis for understanding the fundamental biology and pathophysiology of tissue repairing and remodeling. This course will explore current state-of-the-art overview in literatures and textbooks relevant to mechanistic and therapeutic intervention relevant to abnormal tissue repairing and remodeling. *Spring Semester | Primary Instructor: Qiang Ding.*

Section 01D. Metabolism JC. 1 Hour.
This course will be a literature review course that will cover current and pertinent recent papers concerning metabolic pathways, regulation of metabolism, and the impact of various metabolites on gene expression, cell growth, and differentiation in health and disease. Participation and presentation by each student is required. *Fall & Spring Semesters | Primary Instructor: Natalia Kedishvili*

Section 01E. Protein/Mass Spec JC. 1 Hour.
This course will be a weekly journal club in the area of proteomics and mass spectrometry. Each week leading papers in the field will be reviewed by the students in the class. Emphasis will be placed on papers which focus on the application of these cutting edge technologies to specific biological systems and pathways. Over the course of the semester a wide range of proteomic applications of mass spectrometry will be covered from the papers reviewed including quantifications of proteins, post-transitional modification, biomarker discovery, sample preparation, data analysis, and proteomic experimental design. *Fall & Spring Semesters | Primary Instructor: Matt Renfrow*

Section 01F. Stem Cell Biology JC. 1 Hour.
This Journal Club will focus on the isolation, characterization, derivation, and differentiation of both embryonic and adult stem cells with an emphasis on the hematopoietic system and a focus toward therapies. *Fall & Spring Semesters | Primary Instructor: Thomas Ryan.*

Section 01G. Trans Control in Viruses & Cancer. 1 Hour.
The format of this courses consists of student participation in a journal club format. This is an advanced graduate course that explores recent literature. We will cover topics ranging from Basic discoveries on translation initiation, elongation, termination or regulation. In addition, we will cover articles on how viruses subvert the translational machinery to translate or regulate translation of viral proteins. Students will present papers from the recent literature that are of broad interest to the group and prepare a 15 minute Power Point introduction. Discussions of the paper will be interactive with the entire group that will explore the hypothesis, approach, results, interpretation, and the unanswered questions. The goal of this journal club will be to teach students how to think critically and creatively. The time and location of the course will be determined based on availability and preference of the students. Class will meet for 60 minutes once a week. Please contact the course master if you enroll. *Fall & Spring Semesters | Primary Instructor: Sunnie Thompson.*

Section 01H. Parkinson's Disease JC. 1 Hour.
The goal of this journal club is to be current with all the recently published high impact studies related to Parkinson's disease. Our other goal is to try to start thinking outside the box with respect to this disorder, which is likely many different diseases. We will read articles related to idiopathic PD, lewy body dementias, multiple systems atrophy, and even Alzheimer's disease. We will also read articles ranging from biophysics to cell biology to behavior to biomarkers to genome wide association studies. Articles not directly related to PD but presenting a novel technique or concept that could be relevant to our work will also be considered. *Summer Semester | Primary Instructor: Laura Volpicelli-Daley.*

Section 01J. Adv Eukaryotic Molecular Biology JC. 1 Hour.
In this Journal Club, we discuss the latest research reports on topics of eukaryotic molecular biology, with special emphasis on mechanisms of eukaryotic gene transcriptional regulation. *Fall & Spring Semesters | Primary Instructor: Tim Townes.*

Section 01K. Striated Muscle Biology JC. 1 Hour.
For Trainees, Faculty and Students interested in any aspect of skeletal muscle or cardiac muscle biology. *Fall & Spring Semesters | Primary Instructor: Glenn Rowe.*

Section 01M. CNS JC. 1 Hour.
This course will focus on critical review and discussion of current and seminal research on central nervous systems trauma, focusing on traumatic brain injury and traumatic spinal cord injury. Course participants will select, critically evaluate, and discuss a current or seminal article from the peer-reviewed medical and scientific literature on central nervous system trauma. Topics will include all aspects of CNS trauma such as epidemiology, clinical management, as well as preclinical evaluations of protective strategies, pathobiological mechanisms, and novel therapies for rehabilitation, repair, regeneration of damaged CNS tissue. The course master will guide the discussion and all learners in the course will participate. The learning objective are 1) increase the learner's knowledge of fundamental concepts relating to CNS trauma, 2) to develop skills for critical analysis of the medical and scientific literature, and 3) to increase skills of presentation and scientific discussion. *Fall & Spring Semesters | Primary Instructor: Candace Floyd.*

Section 01N. Cardio-Renal Physiol JC. 1 Hour.
The Cardio-Renal Physiology and Medicine Journal Club explores state-of-the-art topics in vascular and renal physiology and pathophysiology. Topics are rotated monthly to provide focus on the cardiovascular and renal system, while highlighting interplay

between the systems based on their underlying physiology. Students will gain insight into hypothesis testing, critical thinking skills, new paradigms for research, and cutting-edge experimental methods and models. *Fall & Spring Semesters | Primary Instructor: Christian Faul.*

Section 01O. JC- Biomedical Informatics. 1 Hour.
Wednesdays, 4-5PM Informatics Institute Tinsley Harrison Tower First Floor Brief description of the JC: Biomedical informatics is an interdisciplinary field that brings together biology, medicine, nursing, computer science, cognitive science, public health and much more. This journal club will discuss papers across the spectrum of bioinformatics, translational research informatics, clinical research informatics, clinical informatics and population informatics. Presenters will be expected to discuss papers approved by the instructor, with discussion of historical context of the work, comparison with similar papers, and critique of the science presented. *Fall & Spring Semesters | Primary Instructor: James Cimino*

Section 01P. CB2-401 & Seminar JC. 1 Hour.
This CB2-401: 401 Journal Club and Seminar is a complement to the other CB2 courses offered. JC meets every Thursday, 10am-11am, in the Finley Conference Center in the Kaul Building. Contact the course masters for the exact start date. *Fall & Spring Semesters | Primary Instructor: Malay Basu.*

Section 01Q. Mechanisms of Degeneration in Parkinsons JC. 1 Hour.
This journal club will study recent papers published in high impact journals related to molecular mechanisms in Parkinson's disease, and similar neurodegenerative disorders. *Fall & Spring Semesters | Primary Instructor: Laura Volpicelli-Daley | Instructor: Andrew West.*

Section 01R. Oral and Skeletal Biology JC. 1 Hour.
Also listed as CD 721. *Fall & Spring Semesters | Primary Instructor: Amjad Javed.*

Section 01S. Free Radical & Redox Biology JC. 1 Hour.
This Journal Club will consist primarily of student presentations of peer-reviewed journal articles and/or relevant research-related topics. Students should plan to present at 30-40 minute presentation using the Power Point format, which will then be followed by a period of discussion. The course director and at least one other faculty member will attend the student presentations. The role of the attending faculty will be to guide and facilitiate the discussion among the students and other members of the audience. Permission of the Instructor is required to enroll in this JC. *Fall & Spring Semesters | Primary Instructor: Rajasekaran Soorappan.*

Section 01V. Central Dogma of Molecular Biology JC. 1 Hour.
This Journal Club will be a literature review course that will cover current and pertinent recent papers concerning DNA replication, transcription, gene regulation and protein synthesis. Eukaryotic systems will be emphasized, but none of the three domains of life will be excluded. Special effort is devoted to developing presentation skills and scientific discussion. Participation and presentation by each student is required. *Fall & Spring Semesters | Primary Instructor: David Schneider.*

Section 01W. Mol Basis Resp Dis JC. 1 Hour.
This journal club will study molecular defects that contribute to human respiratory disease, including but not limited to cystic fibrosis (CF), chronic obstructive pulmonary disease (COPD), primary ciliary dyskinesia (PCD), asthma and others. Special emphasis will be placed on recent discoveries that further our mechanistic understanding of disease pathogenesis, as well as experimental modulation of key pathways for development of novel therapeutic interventions. Student participation, presentation of at least one article per semester, and attendance are required. *Fall & Spring Semesters | Primary Instructor: Susan Birket.*

Section 01X. Sleep Medicine JC. 1 Hour.
This course meets Fridays, 1pm in Sparks Center 3rd floor. This journal club is designed to discuss recent literature regarding neurobiological mechanisms controlling sleep and arousal, including basic, clinical, and imaging research exploring regulation of behavioral state. Additionally, content will include recent research on health impact of various sleep disorders, including sleep apnea, hypersomnias, parasomnias, and insomnia. Because sleep and health have a bidirectional relationship, we will also explore the impact of various disease states on sleep. Students can present papers from any field of interest as long as sleep medicine is central to the research outcomes. *Fall Semester | Primary Instructor: Amy Amara | Instructor: Joseph Daley.*

Section 01Y. Advances Mol Exer Med JC. 1 Hour.
The format of this course consists of student participation in a journal club format. This is an advanced, graduate course that explores emerging areas of research defining the molecular and cellular mechanisms that underlie the changes that occur in response to exercise. The particular focus will be on areas in which exercise improves outcomes in diabetes, cardiovascular disease, and cancer. This includes new areas of epigenetic regulation of gene expression and post-translational regulation of protein function. Students will research topics and present a 30 min Power Point on the hypothesis, approach, results, and interpretation of papers within the past few years and their revelance in advancing exercise medicine as a therapeutic tool or means of understanding disease development. JC meets for 8 classes on alternate Mondays, 11:30am-12:30pm, VH G011. Contact course master for information on when classes begin. *Spring Semester | Primary Instructor: Adam Wende.*

Section 01Z. Exer Bio in Neurosci JC. 1 Hour.
This is an advanced, graduate course that explores emerging areas of research defining the molecular and cellular mechanisms that underlie the changes that occur in response to exercise. The particular focus will be on areas in which exercise improves outcomes in central nervous system disorders including neurodegenerative disease, traumatic injury, aging, and developmental disorders. The format

of the course consists of student presentations in a journal club format. Students will research topics and present a 30 min PowerPoint on the hypothesis, approach, results, and interpretation of papers within the past few years and their relevance in advancing exercise medicine as a therapeutic tool or means of understanding disease development. *Spring Semester | Primary Instructor: Candace Floyd.*

Section VT. JC- Genetics & Genomics. 1 Hour.
Students enrolled in the course rotate through a schedule, presenting 1-2 papers each week. The papers broadly describe applications of or advances in genetic and genomic technologies. The presenting student discusses the major findings of the paper, the implications for the field, applications beyond those described in the paper as well as strengths and weaknesses of the study design, analysis, and interpretation. *Offered to students at HudsonAlpha for JC credit. Fall & Spring Semesters | Primary Instructor: Sara Cooper*

GBSC 720. Journal Clubs 2. 1 Hour

Section VTA. Neurodegenerative Diseases JC. 1 Hour.
This Journal Club-style course will consist of topics related to molecular mechanisms of neurodegenerative disorders. Amyotrophic Lateral Sclerosis, Huntington's disease, Parkinson's disease, and Spinocerebellar ataxias. Each week, one student will be responsible to present a manuscript regarding a mechanisms of neurodegeneration. The student will be expected to give a brief overview of the paper topic, discuss the hypothesis and significance of the study, present the data with a discussion of strengths and weaknesses, and discuss any potential clinical applications of the findings. The presenter will be responsible, with the course directors, to facilitate the discussion. *Fall Semester | Primary Instructor: Talene Yacoubian | Instructor: Michelle Gray.*

Section 01B. 100 Things About the Brain JC. 1 Hour.
This course will examine small and big questions in neuroscience as they are presented to the layperson via TED Talks, Scientific American, and newspaper/magazine science op-eds. The aim is to expose students to a wide range of topics about the brain, some fundamental, some controversial, and to challenge them to discuss the evidence for and against theories of brain function. There will be no memorization of information, only the willingness to read, post, and discuss scientific opinions on pre-assigned articles/videos. *Fall Semester | Primary Instructor: Robin Lester.*

Section 01C. Post-Trx Reg Mech JC. 1 Hour.
The Post-Transcriptional Regulatory Mechanisms JC examines different aspects of gene regulation with an emphasis on mRNA processing, localization and turnover mechanisms; protein localization and turnover mechanisms; and various aspects of translational control (including siRNA and miRNA). An emphasis will be placed on reading papers that utilize a wide range of experimental approaches to study these processes. Grades will be based on oral presentations, class participation. *Fall Semester | Primary Instructor: David Bedwell.*

Section 01D. Trans Neuropsychiatry JC. 1 Hour.
This course is appropriate for grad students with an interest in translational neurobiology of psychiatric illnesses, including Anxiety Disorders, Depression, Bipolar, ADD/ADHA, PTSD, Schizophrenia, and other related conditions. The first meetings will focus on clinical aspects of specific disorders with a facilitated discussion of social-environmental risk factors, diagnostic criteria, and treatment options, as well as the clinician-patient therapeutic relationship, the patient experience, and assessments of patient outcomes. Remaining meetings will be a traditional JC, with each student responsible for presenting a translationally relevant original research article. Strong emphasis on class participation. There is an optional component for students to spend the day shadowing a clinical faculty member. Contact the course master for more information. *Fall Semester | Primary Instructor: Badari Birur*

Section 01E. JC-Cardiac Immunometabolism. 1 Hour.
This journal club will discuss the latest advances in two key areas of cardiovascular disease: cardiac metabolism and resolution of inflammation that defines the molecular and cellular mechanisms in heart failure pathology. The major focus will be paradigm shift areas of inflammation and resolution of inflammation axis coupled with mitochondrial dysfunction in cardiovascular disease pathology. The format of the course consists of fellow/course master /student presentations in a journal club format. Students will have opportunity to select best fit research paper/topics in this theme and present a 30 min PowerPoint on the hypothesis, approach, results, and interpretation in relevance to mechanism and clinical translation in cardiac biology. Preference will be given to recent papers within the past few years and their relevance in advancing cardiac immunometabolism, the creative way to precise and personalized treatment for cardiovascular disease. *Fall Semester | Primary Instructor: Lufang Zhou | Instructor: Ganesh Halade.*

Section 01F. JC-Virology. 1 Hour
This journal club will consist of primary research paper presentations and discussions covering current papers addressing any aspect of virology. Possible topics include virus structure, genetics, genomics, evolution, life cycle, replication, molecular mechanisms, virus-host interactions, immune response, epidemiology, pathogenesis, prophylaxis, and treatment. Throughout the semester, it is expected that papers presented will be representative of a wide variety of viral systems, methodologies, and problems. Students will select papers to present with input from the course masters or other participating faculty, and should submit 3 possible papers at least 2 weeks prior to their scheduled presentation. The paper chosen will be distributed at least 1 week prior to the presentation date. As scheduling permits, we will also hold 1 or 2 discussion round-tables during the semester. These discussions consist of 5-10 minute presentations by each student on any paper they find interesting. No preapproval of this paper is necessary. No slides will be used during these discussions. They will consist solely of a brief verbal presentation, followed by a general discussion about the paper and related topics. In addition to student who register for this class, we also welcome faculty and virology trainees (including students, postdocs, and research staff) to participate in the JC (sit in or present). The goal of the journal club is to foster discussions and critical review of the latest research in the

field of virology. If you are interested in presenting a journal paper, please let us know via email. *Fall & Spring Semesters | Primary Instructor: Elliot Lefkowitz | Instructor: Jamil Saad*

Section 01G. JC-Mucosal Immunology. 1 Hour.
Mucosal Immunology Journal Club aims to discuss papers that fall broadly in the area of mucosal immunology, including immunology of infections, immunopathology, as well as basic immunology that impacts on mucosal immunology. Papers presented should fit the following criteria: Research reports in peer-reviewed journals (not reviews); Important new findings of general interest to members, Substantial peices of work with plenty of data to discuss, In the broad area of mucosal immunology, Published within the past year, and Not the work of UAB colleagues*. Fall & Spring Semesters | Primary Instructor: Zina Moldoveanu*

Section 01H. JC-Bact Pathogenesis & Phys. 1 Hour.
The purpose of this JC is to provide a weekly forum for students to present and discuss the latest research related to bacteria physiology and infection. The papers discussed will focus on the molecular basis of gene regulation, stress response, pathogenesis, and subversion of host immunity. Contact the course master for information on when/where JC meets*. Fall & Spring Semesters | Primary Instructor: Carlos J. Orihuela | Instructor: Michael Gray.*

Section 01i. JC-Cell/Mol Immunology. 1 Hour.
The Cellular and Molecular Immunology Journal Club involves weekly meetings during the Fall and Spring semesters. This course is a student-run journal club; as such, regular attendance and participation are required. Students will select and present recent immunologically-relevant articles from primary scientific literature and participate in group discussions. Student selected papers are provided to the instructure 1 week prior to the scheduled presentations and should be read by all participants prior to class meetings. Presentations should be formatted in Microsoft PowerPoint and include a summary of relevant background information, a discussion of techniques and technologies involved int he presented research, and highlight and critique critical findings. The goal of this course is to bring together students from a wide range of immunology themed disciplines and expertise to provide an engaging and inclusive environment to facilitate the collective exploration of the current state of immunology research. *Fall & Spring Semesters | Primary Instructor: Rodney King.*

Section 01J. JC-Phys & Path of Mycobacteria. 1 Hour.
Phys and Path of Mycobacteria JC covers the newest and most exciting research about mycobacteria with a focus on tuberculosis. Occasionally, we discuss top articles or related fields including antibiotic discovery, important molecular mechanisms and cutting-edge technique developments. In addition to expanding your knowledge in an important microbiology field, you will also practice scientific presentation and learn how to critically evaluate and discuss science. *Fall & Spring Semesters | Primary Instructor: Michael Niederweis*

Section 01K. JC-Inflammation & Autoimmunity. 1 Hour.
This Journal Club provides a fortnightly forum for students to present and discuss the latest research related to the cellular and molecular basis of inflammation, autoimmunity and autoimmune disease. The topics of papers will include the roles of specific immunoregulatory and inflammatory cell-types and molecular mediators involved in inflammation, immune tolerance and autoimmune disease. The latest basic, translational and clinical science will be presented and discussed. *Fall Semester | Primary Instructor: Janusz Kabarowski.*

Seminars

GBS 737. Student Summer Seminar Series in Neuroscience. 1 Hour.
Seminar series presented by UAB neuroscience students. Two students present each week. *Required for Neuroscience Theme students. Summer Semester | Primary Instructor: Rita Cowell.*

GBS 777. Cancer Biology Seminar. 1 Hour.
Seminars on various topics in cancer biology or other biomedical science topics. Students will attend a minimum of 12 seminars offered by a Joint Health Sciences department/theme, keeping a journal that includes each seminar date, title and a brief synopsis of each seminar. Journals are to be kept electronically and emailed in on time. Anyone turning in a journal after this deadline will receive NP for the course. *Fall and Spring Semesters | Primary Instructor: Lalita Shevde-Samant| Instructor: Sooryanarayana Varambally*

GBS 792. CMDB Seminar. 1 Hour.
Seminars on various topics in cellular and molecular biology or other biomedical science topics. Students will attend a seminar offered by a Joint Health Sciences department/theme, keeping a journal that includes each seminar date, title and a brief synopsis of the seminar. The journal will be turned in to the theme program office at the end of the semester. *Fall and Spring Semesters | Primary Instructor: Alecia Gross Guetierrez*

GBSC 701. Seminars. 1 Hour.

Section 01A. BMG Seminar. 1 Hour.
This is a weekly seminar series that features extramural and intramural speakers. The topics covered will range from structural biology to developmental biology. Students will be exposed to well-crafted seminars by leading experts in their respective fields. Attendance will improve the student's breadth of scientific knowledge as well as his/her understanding of how to prepare an organized research seminar. Course meets only 1 Wednesday per month. Contact Primary Instructor for more information. *Fall & Spring Semesters | Primary Instructor: Thomas M. Ryan.*

Section 01B. Grad Student Research Mtg Seminar. 1 Hour.
This course is a student seminar series in which each student presents his/her research. Each meeting consists of two 30-minute presentations. After each seminar, discussion among the presenter and his/her peer audience is encouraged. This course provides critical training in research presentation in a relatively low pressure environment. Enrolled students are provided with a complimentary lunch at each meeting of the course. *Fall & Spring Semesters | Primary Instructor: Thomas M. Ryan.*

Section 01C. Translational Cardiovascular Science. 1 Hour.
This course will cover a wide array of basic, clinical, and translational topics in cardiovascular medicine and research that will give the student a broad appreciation of cutting-edge cardiovascular science. Seminars will be given by a variety of scientists and clinicians and will broadly focus on the following focus areas, Cardiac Reparative and Regenerative Medicine; Cardiovascular Risk Factors and Prevention; Heart Failure and Transplantation; Heart Rhythm and Arrhythmias; Valvular and Congenital Disease; and Vascular and Ischemic Heart Disease . The course will be of interest to students concentrating in either the basic or population sciences. *Fall | Last offered F15 | Primary Instructor: Sumanth Prabhu.*

Section 01D. Cancer Biology Theme QE Prep. 1 Hour.
Preparing Cancer Biology Theme students for their qualifying exam. *Fall | Primary Instructor: Lalita Shevde-Samant.*

Theme Required Courses

GBS 703. Research Analysis and Presentation. 1 Hour.
This course is designed to help graduate students with oral presentation skills by exposing them to the style of presentation expected in national meetings. This course is open to any JHS/SOM graduate student, but it is a required course for all students in the GBS PBMM Theme. (Previously PAT 704) *Fall Semester | Primary Instructor: Yabing Chen | Instructor: Robert van Waardenburg*

GBS 717. Methods and Logic in Science. 1 Hour.
This is a literature-based class to teach students how to critically evaluate primary research literature. The students will be expected to critique the thinking processes that went into the experimental design, interpretation and presentation of the papers selected. Through this exercise, it is expected that the students will learn to critically evaluate the experimental design and data interpretation, to improve their logical reasoning skills, and to understand the peer-review process behind scientific publication. *Required for first year CMDB students. Summer Semester | Primary Instructor: Jianbo Wang.*

GBS 734. Neuroscience Historical Literature Discussion Class. 1 Hour.
Discussion of historical neuroscience literature, giving students an appreciation of the early foundations of neuroscience research. Required for first year neuroscience theme students. *Fall and Spring Semester |*

GBS 759. Developing Presentation Skills for Microbiological Research. 1 Hour.
Open only to GBS Microbiology Theme students or with permission of the instructor. The goal of this course is to provide students with the skills to critically evaluate and present their research. In initial sessions, students will learn how to give an effective presentation. Students will then develop their own presentation with advice from a student advisor as well as the course director or other faculty members. Following the presentation, students will address questions from an audience of students and faculty. The students and faculty will also provide written evaluations of the presentation. The student advisor will develop skills in critiquing presentations and introducing a scientific speaker to an audience. *Fall and Spring Semesters | Primary Instructor: Janet Yother.*

GBS 791. Grad Neuro Discussions. 1 Hour.
Students will participate in journal club style discussion on current topics in neuroscience research and develop presentation skills. If you are not in the Neuroscience Theme but would like to take this course, contact the instructor for permission. *Required for first year Neuroscience students.* Fall and Spring Semester. *Fall and Spring Semesters | Primary Instructor: Gwendalyn King | Instructor: Robin Lester*

GBSC 722 Special Topics

Section 01H. Dev of Com Skills for Bio Rsrch. 1 Hour.
Fall and Spring Semesters | Primary Instructor: Louis Justement

Additional Courses

GBS 787. ST: Genomics in Medicine. 1-4 Hours.
This course will be almost completely literature-based. Each student will read and present several papers (at least 6) throughout the course. All students will participate in weekly discussion of the papers. The papers will be broadly focused on applications and implications of clinical sequencing. We will discuss the technical aspects of using next generation sequencing in a clinical settings, existing projects that have successfully applied these techniques and others that have faced challenges, as well as the legal, ethical and social implications of this work. Proposed topics of discussion will be genome and exome sequencing for rare disease diagnosis, genomics for gene discovery in complex disease, precision oncology, and pharmacogenomics. A total of at least twenty papers will be read and discussed over the 10 sessions. The overall goal of this course is to

integrate students understanding of technology, genetic disease, and treatment options. Meets from September 18-November 20. *Offered for students at Hudson Alpha as an Advanced course credit. Primary Instructor: Sara Cooper.*

GBSC 711. Advanced Genetics Study. 1-9 Hours.
Independent study in advanced genetics. *All semesters | Primary Instructor: Kevin Dybvig.*

GBSC 713. Epigenetics Discussion. 2 Hours.
Prerequisite: Graduate Student Status. This course provides the student with an exposure to a wide range of basic epigenetics research topics and will promote scientific literacy, discussion skills, and critical thinking skills. In addition, student will gain experience developing lectures and providing constructive criticisms to their peers. *Fall Semester | Primary Instructor: Farah Lubin | Instructor: Nicole Riddle.*

GBSC 722. Special Topics. 1-9 Hours.

Section 01A. SpTp: Seminar. 1-9 Hours.
Fall Semester | Primary Instructor: Karen Gamble

Section 01B. SpTp: JC. 1-9 Hours.
Fall Semester | Primary Instructor: Karen Gamble

Section 01I. SpTp. Professional Development. 2 Hours.
Fall Semester | Primary Instructor: Laurie Harrington | Instructor: Ada Elgavish & Harry Schroeder

Section VT. ST: Pathology Grand Rounds. 1 Hour.
All trainees/students in Pathology faculty labs and GBS students are encouraged to enroll as the topics discussed will be applicable to any laboratory studying mechanisms of human disease. *Fall Semester | Primary Instructor: Adam Wende*

GBSC 723. Career Development Courses. 1-4 Hours.

Section 01B. Career Dev in Science. 1 Hour.
The purpose of this course is two-fold: i) to inform graduate students and postdoctoral fellows about career options inside and outside of academic research; and ii) to provide skills in career management planning and professionalism. This course will be pass / fail. *Summer Semester | Primary Instructor: Lisa Schwiebert | Instructor: Jami Armbrester.*

Section 01G. Topics in Professional Dev. 2 Hours.
The goal of this course is to enhance the T32-specific mentoring and educational efforts that foster continued development of the trainee in research. An interactive program curriculum has been developed to provide graduate students and post-doctoral fellows with the opportunity to enhance their skills in statistics, oral and written presentations, university-level teaching, grant writing, professionalism, and career development. Further enrichment in the specific area of immunology has been provided in sections that were dedicated to: 'OMICS, Immune-Mediated Diseases, the History of Immunology. Titled, "Topics in Professional Development", the course includes a required weekly seminar series, didactic lectures, and oral and written presentations. *Fall & Spring Semesters | Primary Instructor: Harry Schroeder | Instructor: Laurie Harrington & Ada Elgavish*