Fall 2022 Graduate Course Electives

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Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
4115	**ANAT 7710**	1.5	Neuroanatomy	Adam Douglass	T, TH, F	10:45AM – 11:35AM	EHSEB 2948
First Half Semester *Lecture*		Cross listed with NEUSC 6060 Anatomy of the human nervous system (designed for graduate students).					
Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
10625	**ANAT 7750**	1.5	Developmental Neurobiology	Michael Deans	T, TH, F	10:45AM – 11:35AM	EHSEB 2912
Second Half Semester *Lecture*		Cross listed with NEUSC 7750 Cellular and molecular biology of nervous system development.					
Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
11402	**ANAT 7770**	2.0	Neural Regulation of Metabolism	Owen Chan	T, Th	10:45AM-11:35AM	M LI 1160
Full Semester *Lecture*		This course is intended to be a graduate level course that provides a detailed overview of the central mechanisms that regulate peripheral metabolism and feeding. Topics to be covered include neural circuits involved in the regulation of brain glucose sensing, hypothalamic control of energy balance, the hypothalamic melanocortin system, mesolimbic reward system as well as central connections with liver and adipose tissue and brain energetics. These topics will be discussed in the context of both normal functionality and in the pathophysiology of diseases such as obesity and diabetes.					
Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
18212	**BIOL 5510**		Genes, Development, and Evolution	Michael Shapiro	T, Th	10:45AM-12:05PM	JTB 120
Full Semester *Lecture*		Understanding the molecular basis of evolutionary change is a fundamental challenge in biology. This course focuses on recent scientific literature in genetics and developmental biology to explore the mechanisms that impact evolutionary change. Topics concentrate on animal biology and include the molecular basis of diversity in body plans, limb development and evolution, genetics of pigmentation differences, and variation in other adaptive traits. We will also address how humans have shaped animal diversity through domestication. In some cases, the genes that control normal variation among species are also involved in human disease; therefore, studying the molecular mechanisms of diversity promises a greater understanding of human health. It is recommended (but not required) that BIOL 2030 is taken concurrently or completed prior to taking this course. If this course is full and you'd like to be placed on the waitlist, please fill out the permission code request form here: https://forms.gle/h65phcgcuxunL6jq9 **Please be aware of differential tuition. The fees are not covered by the School of Biological Sciences or the Tuition Benefit Program.**					
Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
16638	**BIOL 5720**	1.0	The Biology of Biotechnolgy	Ryan Watts	F	12:55PM-2:50PM	CSC 10-12
First Half Semester *Lecture*		This course will introduce students to the world of biotechnology discovery and development and will teach real-world applications of biology in industry. From how to found a company, to the rigorous steps needed to bring a drug to patients, students will be introduced to the process of drug discovery and development from multiple perspectives. The course will also offer a basic understanding of functions that work in parallel with discovery research and drug development, including business strategy, portfolio decision-making, and program management.					
Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
18396	**BIOL**	2.0	Computing with Python	David Goldenberg	T, TH	10:45AM-	BIOL 150

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	6120					12:05PM	
Second Half Semester *Lecture*	This course is intended to provide an introduction to computer programming, using the Python language and highlighting applications in biology. The course is intended primarily for first year graduate students in the School of Biological Sciences, but others are welcome. No prior programming experience is required. In addition to an introduction to the Python language, the course includes a bit of history, a general overview of modern computing and the use of Unix-type operating systems (including MacOS and Linux). The course structure will include lectures, in-class computing exercises, homework exercises and a project to completed during the last three weeks of the term. Please contact Shannon Nielsen (shannon.nielsen@bioscience.utah.edu) for a permission code. Spots are limited.						
Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
13140	**BIOL 7961**	1.0	Advanced Topics in Biochemistry and Molecular Biology	Michael Werner	M / F	3:30PM-4:30PM / 10:45AM-11:45AM	CSC 25
First Half Semester *Special Topics*	Topics of special interest taught when justified by student and faculty interest. Content varies from year to year.						
Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
1747	**CHEM 7040**	2.0	Statistical Thermodynamics	Peter Armentrout	M, W, F	11:00AM-12:05PM	HEB 2010
First Half Semester *Discussion Lecture*	This course introduces the statistical machinery used to connect molecular behavior with thermodynamic principles. Covered topics are useful for chemists, physicists, biologists, and engineers.						
Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
1749	**CHEM 7240**	2.0	Physical Organic Chemistry I	Aaron Puri	T, TH	9:10AM-10:30AM	WBB 207
First Half Semester *Discussion Lecture*	Fees: $45.00 Physical organic chemistry studies the approaches to deciphering the mechanisms of organic reactions and the principles that govern host-guest binding. The topics include stereochemistry, conformational analysis, thermochemistry, acidity, tools to decipher reaction mechanisms, rate laws, kinetic isotope effects, linear free energy relationships.						
Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
1752	**CHEM 7250**	2.0	Physical Organic Chemistry II	Ryan Looper	M, W, F	9:35AM-10:40AM	CSC 25
Second Half Semester *Discussion Lecture*	Course examines organic reaction mechanisms involving all fundamental reaction types. Included will be complex mechanisms as combinations of fundamental steps, orbital symmetry controlled reactions (with Woodward-Hoffman, Fukul, and Zimmerman treatments), trajectory analysis and radical reactions.						
Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
12289	**CHEM 7730**	2.0	Fundamentals of Electrochemistry	Shelley Minteer & Henry White	M, W, F	9:35AM-10:40AM	MEB 2325
First Half Semester *Discussion Lecture*	Fees: $54.12 This course will provide an overview of the fundamental concepts of electrochemical science. The course is devoted to the basic principles underlying chemical reactions at the electrode/electrolyte interface.						
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13399	**CHEM 7740**	2.0	Techniques and Applications of Electrochemistry	Shelley Minteer & Henry White	T, TH	9:10AM-10:30AM	HEB 2010
Second Half Semester *Lecture*	This course is designed to introduce you to electrochemical reaction mechanisms, electroanalytical techniques, and electrochemical technologies. Topics to be covered include: a variety of voltammetric and amperometric techniques, electrochemical reaction mechanisms and modified electrodes, and modern electrochemical technologies.						
Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
12637	**CHEM 7770**	2.0	Analytical Spectroscopy and Optics	John Conboy	T, TH	9:10AM-10:30AM	HEB 2010
First Half Semester *Discussion Lecture*	Three lectures, one discussion per week for 7.5 weeks. This course provides an overview of the principles of optical spectroscopy covering the following topics: Basic optics, such as light propagation, polarization, Fresnel's equations, and elementary optics. Mechanics of optical spectroscopy, including light sources, wavelength selection, and dectors. Sensitivity and dynamic range in spectroscopic measurements. Advanced topics in absorbance, fluorescence and vibrational (IR and Raman) spectroscopy. Surface spectroscopic methods based on optical waveguides, total internal reflection, and surface plasmon resonance. Nonlinear optical spectroscopes, including second-harmonic generation and sum-frequency generation.						
Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
6949	**H GEN 6030**	2.0	Special Topics in Genetics	Mark Metzstein	TBD	TBD	TBD
Full Semester *Seminar*	Seminar for Human Genetics graduate students covering current topics in the scientific literature.						
Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
8442	**H GEN 7380**	3.0	Biochemical Genetics	Nicola Longo & Marzia Pasquali	M / W	3:30PM-5:30PM / 4:30PM-5:30PM	EHSEB 3515B
Full Semester *Lecture*	This course will educate physicians and graduate students on the fundamentals of biochemical genetics. Includes inborn errors of metabolism and several common disorders, such as diabetes and hypertension, which have biochemical bases correctable by diet or other medical intervention. Provides overview of biochemical pathways, practical experience on how the biochemical pathways can be studied in vivo and in vitro, the molecular bases of common metabolic problems, the mechanism of inheritance including recurrence risk, and how to rationally treat metabolic blocks.						
Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
18946	MDCRC 6450	3.0	Grant Writing	Jorie Butler, Anthea Letsou, & Julie Shakib	T	5:30PM- 7:30 PM	EHSEB 2938
Full Semester *Lecture*	This class is designed to give students hands-on experience in grant writing (including NIH, NSF, and Foundation grants). Discussion topics include persuasive writing for all grant components (Abstract, Specific Aims, Research Plan, and BioSketch) as well as how these components are integrated in a completed research or career award application. We will also discuss scoring criteria and the peer review process. The class will include foundational science, clinical and translational science, and bioinformatic break-out sections. Email Kellie.E.Brown@hsc.utah.edu for a permission code. Cross listed with BMI 6112						
Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
13023	**MDCRC 6521**	1.0 - 5.0	Medicine & Physiology for Molecular Biologists	Kevin Whitehead	T, TH	9:10AM-10:30AM	EHSEB 2600

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Full Semester *Special Topics*		This course explores and provides a richer understanding of human physiology and pathophysiology. This information is critical for understanding the importance of any molecular mechanism at the level of cells, organ and whole animals, and applying this information to humans. **This course has a DIFFERENTIAL TUITION attached to it that is NOT covered by the Tuition Benefit Program.**					
Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
5796 / 14836	**MBIOL 7570**	1.0	Case Studies and Research Ethics	Joyce Havstad	W	4:00PM-5:20PM	GC 2900 (First Half) / CTIHB 101 (Second Half)
First Half Semester / Second Half Semester *Discussion Lecture*		Cross listed with PHIL 7570 An examination of research integrity and other ethical issues involved in scientific research. Topics may include scientific fraud, conflicts of interest, plagiarism and authorship designation, and the role of science in formulating social policy. This course is designed for graduate students, post-docs and regular faculty in the sciences.					
Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
4856	**PATH 7330**	3.0	Basic Immunology	Hans Haecker	T, TH	2:00PM-3:30PM	EHSEB 2958
Full Semester *Lecture*		Cross listed with PATH 5030 This is a survey course covering the basic principles in Immunology with lectures provided by faculty directly involved in particular areas. The final third of the course will feature clinical and experimental topics in Immunology. The course is primarily slated for graduate and master students. It is also open for particularly interested undergrad students, but is not specifically intended as preparation for Med School due to its programmatic depth. Students should have some exposure to biochemistry, modern genetics, and cell biology. It meets the requirements for the Medical Technology (B.S.) and Medical Laboratory Science (M.S.) programs. Undergrad students are encouraged to complete BIOL 2020, 2030 and 3510 prior to taking this course.					
Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
9945	**PHCEU 7010**	1.5	Molecular Biology for Pharmaceutical Scientists	Katherine Bowman & Carol Lim	M, W	11:00AM-12:30PM	EHSEB 2600
Second Half Semester *Lecture*		This course will review fundamental aspects of genetic engineering and molecular biology, with application to health sciences.					
Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
7870	**PHCEU 7030**	2.0	Macromolecular Therapeutics and Drug Delivery	You Bae	T, TH	8:50AM-10:50AM	EHSEB 3430
First Half Semester *Lecture*		Introduction to polymer in Pharmaceutics and drug delivery. Transport phenomena in drug delivery systems. Macromolecular and vesicular carriers. Biorecognition and drug targeting. Protein, oligonucleotide, and gene delivery systems					
Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
14163	**PHCEU 7040**	3.0	Biotechnology	James Herron & Shawn Owen	M, W, F	10:00AM-12:00PM	EHSEB 5100B
First Half Semester		Principles of kinetics and mechanisms of organic reactions and structure-reactivity relationships applied to pharmaceutical systems. Mechanisms of the degradation and stabilization of drugs, proteins, and DNA.					

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Lecture							
Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
12609	**PH TX 7113**	3.0	Essentials of Pharmacology and Toxicology	Louis Barrows	T, TH	1:30PM-3:00PM	TBD
Full Semester *Lecture*		This course will introduce graduate students to the basic principles of pharmacology and toxicology. The first half of the course will focus on the role of drug molecule structure, receptor physiology, ion channels, transporter functions, ligand binding kinetics and intracellular signaling in relation to biological effects of drugs. The second half of the course will introduce the basic principles of pharmacokinetics including physiochemical factors and individual variations that affect the absorption, distribution, metabolism and excretion of drugs. This course will also introduce the students to drug development principles including strategies used by pharmaceutical companies for drug screening, the role of regulatory agencies, designing of clinical trials and issues related to risk assessment during drug development including adverse drug reactions and the role of pharmacogenetics.				

Fall 2022 Selectives

All first year students will self-select two (2) selectives courses that match their research interest and/or explore the range of disciplines and research emphasis areas.

- All Selectives will be held during Second Half Semester
- Please note some classes overlap in days/times.
- Contact the Instructor or Department Coordinator to confirm if advanced students can enroll along with first year students and if a permission code is required
- Selectives will be 1.5-3 credits each

Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
18385	**ANAT 6400**	1.5	Fundamentals in Cellular and Molecular Neuroscience	Jason Shepherd	M, W	9:00 - 10:30 AM	BPRB 501
		The nervous system is the most complex organ in the body; behavior requires unique cell biology and biochemistry. The goal of this course will be to introduce core cellular and molecular processes in the main brain cell types; neurons and glia. In addition, we will highlight how these processes can go awry in neurological disorders. Topics covered include: Cellular and molecular composition of the nervous system The molecular basis for synaptic transmission – the conversion of electrical activity by chemical synapses. How synapses form circuits during development and learning How synapses signal to the nucleus to regulate gene expression The role of glia (microglia and astrocytes) in brain function. Molecular basis of common neurological disorders New advanced methods to study the brain – optogenetics, human pluripotent stem cells, organoids				
Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
18577	**BIO C 6420**	1.5	Biophysical Methods	Michael Kay & Wes Sundquist	T, TH	2:30 - 3:50 PM	EHSEB 5100C
		This course will focus on biochemical and biophysical approaches to studying proteins and their functional interactions. Topics covered will include: protein-ligand interactions, cooperativity and allostery, protein folding and design, spectroscopic techniques, analytical ultracentrifugation, calorimetry, biosensors, proteomics approaches, and protein structure prediction.				

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18654	**BIO C 6430**	1.5	Structural Methods	Julia Brasch, Erhu Cao & Peter Shen	M, W, F	2:00 - 2:50 PM	BPRB 501
		This course provides an integrated approach to the applications of X-ray crystallography and electron microscopy in structural biology. Topics covered include basic theory and the application of methods of structure determination, including X-ray crystallography, single particle electron cryo-microscopy (cryo-EM), and electron cryo-tomography (cryo-ET).					
Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
18180	**BIO C 6600**	1.5	Regulation of Metabolism	Keren Hilgendorf & Janet Lindsley	T, TH	9:30 - 11:00 AM	EHSEB 2600
		This half-semester course will begin with a review of carbohydrate and lipid metabolic pathways, particularly pathway integration and regulation. It will then progress into discussions of the breadth of metabolism research questions being asked at University of Utah Health Sciences by a variety of faculty.					
Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
18398	**BIOL 6140**	1.5	Advanced Genetics	Kent Golic, Kelly Hughes, & Erik Jorgensen	M, W, F	10:45 - 11:35 AM	CSC 25
		Advanced Genetics covers the fundamentals of classical genetics and genetic analysis in prokaryotes and eukaryotes. Classical genetics encompasses the mechanisms of inheritance and the behavior of genes and chromosomes in somatic cells and germ cells. Genetic analysis is a branch of biological investigation that uses mutations and mutant phenotypes to study the function and behavior of cells and groups of cells, in isolation and in a developmental context. Prokaryotes and eukaryotes have different modes of inheritance and significant differences in gene regulation and in their cellular biology. Prokaryotes provided the foundational discoveries of molecular biology and continue to be a source of new genetic tools and biological understanding with health and ecological relevance. Modern eukaryotic genetics blends the tools of molecular biology, cell biology and classical genetics to investigate gene and cell function in complex organisms.					
Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
12635	**CHEM 7430**	2.0	Chemical Biology of Proteins	Ming Hammond	T, TH	9:10 - 10:30 AM	HEB 2002
		This is a one half semester course that focuses on the application of organic chemistry to the study and manipulation of proteins. Topics include chemical synthesis of peptides, proteins, and peptide mimics and chemical biology methods to study the role of proteins in cell biology and signaling. Prerequisite: 2 semesters undergraduate organic chemistry.					
Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
1753	**CHEM 7450**	2.0	Biophysical Chemistry	Jessica Swanson	M, W, F	9:35 - 10:40 AM	HEB 2010
		Topics covered include: Basics of thermodynamics and statistical mechanics, with applications in biochemistry; transport phenomena; enzyme kinetics and inhibition; kinetic isotope effects; principles and applications of absorbance, fluorescence, and CD spectroscopies.					
Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
18270	**ONCSC 6500**	1.5	Molecular Mechanisms of Cancer	Sean Tavtigian	M, W, F	3:00 - 3:50 PM	HCI South Auditorium
		Review current understanding of the genetic, molecular, and cellular biology of cancer and how this knowledge relates to the prevention, diagnosis, and treatment of cancer.					
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20143	**ONCSC 7700 - 011**	1.0	Cell Biology	Matthew Miller & Ben Myers	T, TH	2:30 - 4:00 PM	HSEB Alumni Hall
		This course covers basic and advanced topics related to cell structure and function including cytoskeleton, membrane trafficking, protein targeting/modification and degradation, cell cycle regulation, and signal transduction.					
Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
18557	**PATH 6500**	1.0 - 2.0	Immunity, Inflammation and Infectious Disease	June Round, Ryan O'Connell, & Matthew Williams	M, W	1:30 - 2:50 PM	EHSEB 4100C
		The immune system is an integral part of virtually every organ system of the body including the neuronal, digestive, cardiovascular and endocrine, to name just a few. Moreover, while the immune system is fundamental to our ability to fend off infectious pathogens, it is intimately involved in a variety of diseases that plague the modern world including all cancers, behavioral diseases, and autoimmunity. Studies in immunology have led revolutionary discoveries that have fundamentally transformed human health, such as protection from deadly pathogens through vaccination and reversal of cancers through immune-based therapies. Thus, an understanding of basic immunological concepts is broadly applicable in multiple disease settings. Furthermore, the immune system provides an effective platform for understanding fundamental concepts of cellular and molecular biology, including events controlling cellular development, differentiation and function, DNA recombination and repair, and cell signaling. This course was designed to introduce basic immunology while integrating and helping to solidify cell biology, genetic and molecular biology concepts. This course will allow you to address questions such as: How does the immune system detect and respond to microbes? How does immunity elicit protection from microbes? Why doesn't the immune system react to self tissue? How do cells of the immune system differentiate and make fate decisions in response to external stimuli? What are the mechanisms used by the immune system to recognize such a diversity of microbes? How is the immune system used to fight cancer? Why don't we generally get sick twice with the same pathogen? Undergraduate exposure to basic principles of cell biology, genetics, and molecular biology will improve understanding of this course.					
Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
18710	**PHARM 6500**	2.0	Therapeutics Discovery, Development, and Evaluation	Raphael Franzini	M, W, F	11:10 - 12:00 PM	EHSEB 4100C
		This half-semester course, which is open to graduate students from departments in the College of Pharmacy and those participating in the Biological Chemistry/Molecular Biology PhD programs, will explore the process of developing therapeutics. Subject matters include steps spanning the entire drug development process from discovering active species, developing them into compounds that are suitable for clinical evaluation, assessing pharmacokinetics and pharmacodynamics, and determining the efficacy of candidates in clinical studies and after FDA approval					

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