

Spring 2024 Electives/Advanced Seminars

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Frequent MB & BC Electives

Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
11928	BIOL 6500	3.0	Advanced Statistical Modeling for Biologist	Jody Reimer	M, W	2:00PM-3:30PM	JTB 320
Full Semester		<i>Frequent MB Elective; Counts as 2 electives</i>					
Lecture		<p>This course is designed for life science graduate students with a perhaps rusty background in mathematics and statistics who wish to become real practitioners of the art of modern statistics. The course is based on the R programming language.</p> <p>To obtain a registration code, please contact the instructor and Shannon Nielsen shannon.nielsen@bioscience.utah.edu</p>					
12348	CHEM 7470	2.0	Nucleic Acid Chemistry	Ming Hammond	T, Th	9:10AM - 10:30AM	HEB 2010
Second Half Semester		<i>Frequent BC & MB Elective; Prerequisite: 2 semesters undergraduate organic chemistry.</i>					
Lecture		<p>This is a one half semester course that focuses on the application of organic chemistry to the study and manipulation of nucleic acids. Topics include chemical synthesis of DNA and RNA, nucleoside and oligomer analogs, chemistry of DNA damage and repair, nucleic acid-targeted drugs and binding agents. Prerequisite: 2 semesters undergraduate organic chemistry.</p>					
12328	H GEN 6020	1.0	Advances in Genetics	David Grunwald Mark Metzstein	W	2:00PM-4:00PM	EHSEB 4100D
Full Semester		<i>Frequent MB Elective</i>					
Seminar		Seminar for graduate students. Faculty and topics will change yearly. Consult instructor before registration.					
19544	H GEN 6060	2.0	Applied Computational Genomics	Aaron Quinlan	T, TH	10:30AM-11:50AM	EHSEB TBA
Full Semester		<i>Frequent MB & BC Elective; Counts as 2 electives</i>					
Lecture		<p><i>Prerequisite: Intro to R for Data Analysis Workshop (https://utah.catalog.instructure.com/browse/ds-learn/courses/introduction-to-r-for-data-analysis). A free self-paced course through DELPHI</i></p> <p>This course will provide a comprehensive introduction to fundamental concepts and experimental approaches in the analysis and interpretation of experimental genomics data. It will be structured as a series of lectures covering key concepts and analytical strategies. A diverse range of biological question enabled by modern DNA sequencing technologies will be explored including sequence alignment, the identification of genetic variation, structural variation, and ChIP-seq and RNA-seq analysis. Students will learn and apply the fundamental data formats and analysis strategies that underlie computational genomics research. The primary goal of the course is for students to be grounded in theory and have the ability to conduct independent genomic analyses.</p>					
11254	H GEN 6091	1.5	Evolution & Development	Gabrielle Kardon Michael Shapiro	T, TH	1:15PM-2:45PM	EHSEB 2962
Second Half Semester		<i>Frequent MB Elective</i>					
Lecture		<p>This course will explore the molecular, developmental, and genetic mechanisms underlying evolutionary change, with an emphasis on current research in animal biology. Topics include regulatory networks and signaling pathways, modularity, developmental constraints, origin of animals, molecular/developmental origin of diverse body plans and appendages, and genetics of speciation. The class will consist of both lectures and discussions of current literature. Suitable for graduate students at all levels.</p>					
13131	H GEN 6092	2.0	Evolutionary Genetics and Genomics	Ellen Leffler	M, W, F	9:30AM - 10:20AM	EHSEB 5100C
First Half Semester		<i>Recommended MB Elective</i>					
Lecture		<p>This course will cover the fundamentals of population and evolutionary genetics with an emphasis on molecular and sequence-level approaches, including practical exercises in computational analysis aimed at students at all levels of experience. Lectures will cover both theory and experimental studies of the forces that shape genetic variation within and between species.</p>					

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6991	H GEN 6421	1.5	Genetics of Complex Diseases	Lynn Jorde	W	1:30PM-3:30PM	EHSEB 4100B
First Half Semester		<i>Frequent MB Elective</i>					
Lecture		Course work addresses issues relevant to the identification of genes underlying susceptibility to complex disorders. Subjects covered include advantages and disadvantages of isolates versus large population, utilization of affected sibling pairs, discordant sibling pairs and extended families. Methods taught include traditional case-control association methods and family based methods. Other subjects include locus and allelic heterogeneity, phenotypic heterogeneity, gene-gene and gene-environment interactions and density of polymorphic markers.					
4908	H GEN 6481	1.5	Cellular Signaling	Charles Murtaugh	M, W, F	10:45AM - 11:35AM	EHSEB 4100C
First Half Semester		<i>Frequent BC & MB Elective</i>					
Lecture		This course will examine the mechanisms of a variety of eukaryotic signal transduction pathways, and explore how these pathways affect the behavior of cells within developing and adult tissues. The material will include readings and discussion of the primary literature, and emphasize experimental techniques and analyses.					
10786	MDCRC 6530	2.0	Utilization of Animal Models in the Development of Clinical Research Projects	Anthea Letsou	W	1:00PM-2:30PM	TBA
Full Semester		<i>Frequent MB Elective; Counts as 2 electives</i>					
Lecture		<i>Med-2-Grad Core Course Requirement</i> It is now possible to precisely modify any DNA sequence within the genome of the mouse. This course emphasizes using mouse models to dissect the genetic basis of human disease. Deletion of genes using homologous recombination will be covered extensively as will other methods of gene inactivation (anti-sense constructs, inhibitory RNA, etc.). New experimental systems for modeling human disease in zebra fish and C. elegans will also be covered.					
12236	PATH 7320	1.5	Topics in Immunology	Matthew Bettini	T, TH	1:00PM-2:30PM	EEJMRB Conference RM 5420
First Half Semester		<i>Frequent MB Elective</i>					
Lecture		This class is specifically geared toward 1st year MB students. Other students should contact Dr. Bettini prior to registering. This course will address core topics in immunology including cellular and molecular mechanisms of innate and adaptive immune responses to infection, vaccines, autoimmunity and cancer immunology and immunotherapies.					
14814	PATH 7360	1.5	Advanced Immunology	Wan-Lin Lo	T, Th	2:00PM-3:30PM	EEJMRB RM 2420
First Half Semester		<i>Frequent MB Elective</i>					
Lecture		Prerequisite: A survey course in Immunology (such as PATH 5030) and some exposure to Biochemistry, Cell Biology, and Genetics. This is an advanced lecture and seminar course addressing topics of immunological research and interest. The course will focus upon original research articles, not a textbook. Students will be expected to participate in discussions. Class grade will be determined based upon classroom participation and a research proposal based upon some aspect of immunology covered in this course. <i>(Conflicts with BLCHM/MBIOL 6200 Critical Thinking in Research)</i>					
9630	PHCEU 7011	3.0	Fundamentals of Pharmacokinetics	James Herron Daniel Malone Shawn Owen	W, F	10:30AM - 12:00PM	EHSEB 4100B
Full Semester		<i>Frequent BC Elective; Counts as 2 electives; Prerequisite: PHCEU 7010, or Special Permission from Instructor</i>					

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Lecture	This course will review fundamental aspects of pharmacokinetics with an emphasis on understanding concepts for compartmental and non-compartmental modeling, physiologic modeling, and modeling of targeted drug delivery systems. The goal of the course is to understand how these techniques can be used to optimize drug delivery.
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Additional Electives

Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
1984	ANAT 7690	3.0	Scientific Lecturing and Writing	Kurt Albertine	TBA	TBA	TBA
Full Semester	<i>Counts as 2 electives</i>						
Seminar	To provide guidelines for writing clear scientific papers and delivering good lectures. Lectures, discussion, homework assignments and submission of a new original scientific paper in an area chosen by each student.						
Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
10364	ANAT 7760	3.0	Stem Cells and Regenerative Medicine	Alex Shcheglovitov Colin Maguire	T, TH	2:00PM-3:30PM	EHSEB 3420
Full Semester	<i>Counts as 2 electives</i>						
Lecture	The course will begin with a lecture series on the fundamentals of stem cell biology and the use of stem cells, in particular induced-pluripotent stem cells (iPSC), as models for the study of development and disease. Following the lecture series, each student will present a journal article related to a lecture topic, and write the Specific Aims page of a hypothetical grant application based on one of the discussion papers. Lab sessions will provide students with practical hands-on techniques required for reprogramming, culturing, and cryopreserving iPSCs. If you wish to attend, please email Alex Shcheglovitov to request the registration code.						
Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
19549	BIO C 7100 - 005	1.0 – 2.0	CryoEM Image Processing	Peter Shen	TBA	TBA	TBA
Second Half Semester	<u>Advanced Seminar:</u> Student and faculty discussion of advanced-level topics not covered in formal courses.						
Special Topics							
Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
8801	BIOL 6530	3.0	Foundations in Biological Chemistry	David Blair Martin Horvath	T, TH	10:45AM - 12:05PM	HEB 2008
Full Semester	<i>Counts as 2 electives</i>						
Lecture	The course fee covers all required textbooks and course materials at a reduced cost. Students may request to opt out here: https://portal.verba.io/utah/login Structure and function of biomolecules, metabolism, and regulation. To obtain a registration code, please contact the instructor and Shannon Nielsen shannon.nielsen@bioscience.utah.edu						
Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
14019	BIOL 7961	1.0	Advanced Topics in Biochemistry and Molecular Biology	Toto Olivera	M, W	3:30PM-5:30PM	BIOL 306
Second Half Semester	Topics of special interest taught when justified by student and faculty interest. Content varies from year to year.						
Special Topics	To obtain a registration code, please contact the instructor and Shannon Nielsen shannon.nielsen@bioscience.utah.edu						
Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
11937	BIOL 7962	1.0	Advanced Topics in Cell and Developmental Biology	Markus Babst	M, W	3:30PM-5:30PM	BIOL 306
First Half Semester	Topics of special interest taught when justified by student and faculty interest. Content varies from year to year.						
Special Topics	To obtain a registration code, please contact the instructor and Shannon Nielsen shannon.nielsen@bioscience.utah.edu						

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13846	CHEM 7020	2.0	Introduction to Spectroscopy I	Michael Morse	M, W, F	11:00AM-12:05PM	HEB 2010
First Half Semester Lecture	This course provides an introduction into the application of time-dependent quantum mechanics and perturbation theory in modern spectroscopy. Students will learn to derive selection rules and properties of electronic, vibrational and rotational transitions in atomic and molecular systems. This course covers topics useful for chemists, physicists, and engineers with a solid background in quantum mechanics.						
12306	CHEM 7160	2.0	Organometallic Chemistry I	Matthew Sigman	T, TH	9:10AM-10:30AM	HEB 2010
First Half Semester Lecture	This course is intended for graduate students in Chemistry with interests in the intersection of organic and inorganic chemistry. Organometallic chemistry is defined by metal complexes performing chemical reactions might involve intermediates containing transition metal-carbon bonds. The course will introduce fundamental concepts of both inorganic and organic chemistry and the application of these concepts to designing and applying catalytic chemical reactions to target directed organic synthesis, chemical biology, and material science. <i>(Conflicts with MBIOL 6490 Introduction to Biostatistics and Probability for Biosciences)</i>						
8588	CHEM 7300	2.0	Polymers: Chemistry	Ilya Zharov	T, TH	10:45AM-12:05PM	HEB 2010
First Half Semester Lecture	This course will cover the fundamentals of polymer chemistry and polymer structure. The topics will include basic types of polymers, their characterization, mechanisms of polymer formation, specific examples of polymer structures, applications of polymeric materials, advances in polymer chemistry. Three lectures, one discussion per week for 7.5 weeks. Students will be required to pass a midterm and a final exam and prepare a presentation on a topic of current interest in the area of polymer chemistry.						
18714	CHEM 7520	2.0	Computational Chemistry Laboratory	Ryan Steele	M, W, F	9:35AM-10:40AM	HEB 2010
Second Half Semester Lecture	This course provides an introduction to electronic structure theory. Coverage includes (a) a theoretical foundation of computational methodology and (b) the practical usage of computational software packages as research tools. The course is useful for all branches of chemistry, as well as physics, engineering, and biology.						
18713	CHEM 7580	2.0	Advanced Topics in Biological Chemistry	Cynthia Burows	T, TH	9:10AM-10:30AM	TBBC 4630
First Half Semester Special Topics	This course will explore Chemistry of the Origins of Life, including prebiotically feasible catalysis to generate amino acids, RNA, other chiral metabolites and simple vesicles.						
4658	CHEM 7780 -001	2.0	Surface Chemistry	Scott Anderson	M, W, F	8:20AM - 9:25AM	HEB 2010
First Half Semester Lecture	This course is a half semester introduction to the physics and chemistry of solid surfaces, with about equal emphasis on scientific questions and on the spectroscopic and other methods used to probe surfaces. The focus is decidedly practical, and the course is intended for graduate students needing to understand surface properties in their future research, or for those interested in learning how to analyze surfaces.						
15373	NEUSC 6050	4.0	Principles of Systems Neuroscience	Adam Douglass Jim Heys	T, TH, F	10:45AM-12:05PM	EHSEB 2880
Full Semester Lecture	<i>Counts as 2 electives</i> Perhaps the most essential function of the brain is to generate behaviors that maximize an animal's well-being in a dynamically changing environment. Doing so requires often-enormous numbers of neurons to work together in a highly coordinated way. In this course, we will learn about the principles that govern such activity within neural circuits and how they shape an animal's ability to sense, learn, plan and ultimately adapt to its environment. Our approach will use a combination of didactic lectures and group discussion that emphasizes the primary systems neuroscience literature, and the myriad quantitative and experimental techniques that are used to understand the brain.						
19698	ONCSC 6700	1.5	Cell Cycle Events: Mechanisms	Bruce Edgar Katharine Ullman	TH	2:00PM-4:00PM	HCI Research

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First Half Semester Special Topics		This course will give students an in-depth view of the mechanisms of cell division and proliferative control. The course will be structured around classic and current literature reporting advances in the understanding of cell cycle events. Through discussion we'll consider how these events are integrated, and how mechanistic knowledge impacts our understanding of and approach to human disease. This will often relate to implications for cancer (therapeutic sensitivity, tumorigenesis, etc.), but may extend to other diseases. This is an advanced seminar course with a focus on critical reading of the primary literature and student presentations.						South 3C
8022	PHCEU 6020	3.0	Biomaterials	Hamidreza Ghandehari	T, TH	10:45AM - 12:05PM	GC 2760	
Full Semester Lecture		<i>Counts as 2 electives</i> Chemical, physical, and biological properties of synthetic polymer, metal, and ceramic biomaterials. Relationship between the structure of biomaterials and their interaction with blood, soft, and hard tissue. Mechanical properties, fabrication, and degradation mechanisms, and performance testing of materials in biomedical use.						
11327	PHCEU 7020	4.0	Physical Chemistry of Biomedical and Drug Delivery Systems	David Grainger	T, TH	2:00PM-4:00PM	EHSEB 4100B	
Full Semester Lecture		<i>Counts as 2 electives</i> Physicochemical fundamentals of dosage form design. Molecular thermodynamics approach to establishing principles of solutions, structures of liquids and solids, complexation, ion-solvent interactions, and multiple equilibria of organic solutes. Physicochemical examination of peptides and proteins, and protein structures. Thermodynamics of nucleic acids: temperature effects, cooperativity, and hybridization equilibria. Principles of colloid and interfacial sciences applied to pharmaceutical dosage formulations.						
10802	PH TX 7114	2.0	Principles of Toxicology	Alessandro Venosa Cameron Metcalf	F	1:00PM-3:00PM	TBA	
Full Semester Lecture		Prerequisite: Instructor's Consent; <i>Counts as 2 electives</i> General principles, testing procedures, toxic responses, and target organ toxicities. This course is designed to familiarize students with adverse effects that chemicals may produce based on the dose, exposure and hazard of those chemicals. There will be a focus on mechanisms of toxicity in different organ systems (Neurotoxicology, cardiovascular, lungs, skin and kidney toxicology) that are relevant based on common exposure. The course will also cover environmental toxicology, toxic effects of pesticides, and natural products.						
10803	PH TX 7221	1.0-6.0	Pharmacology II	Philip Moos	TBA	TBA	TBA	
Full Semester Lecture		Prerequisite: Instructor's Consent. Mechanism of action and pharmacologic effects of drugs acting on the cardiovascular and renal systems; pharmacology and mechanism of action of antibiotics and other chemotherapeutic agents; drugs acting on endocrine systems.						
14174	PH TX 7690	2.0	Professional Skills Development	Kristen A. Keefe	W	3:00PM-5:00PM	EHSEB 4100C	
Full Semester Special Projects		<i>Counts as 2 electives</i> In this course, trainees will focus on developing four professional skill areas to promote their leadership and communication skills. First, the course will address technical writing, with a focus on manuscript/review and technical report communications. These sections will emphasize rigor and transparency in scientific writing, including figure preparation, data analysis and reporting of results. Exercises will focus on preparation of a manuscript or review based on the trainee's research to date or research area. Second, students will learn about communication styles and rhetorical devices to apply to communicating their science to different stakeholders, including training in the preparation and delivery of a "Ted-talk" format presentation. Third, the class will address leadership development, including assessment of leadership strengths and capabilities, and approaches to and practice in mindful leadership and effective team performance, collaboration and communication. Finally, career development issues including cover letters, resumes, and interviewing will be addressed. Students will prepare resumes and cover letters, as well as develop PAR/STAR-format descriptions of their knowledge and skills related to their career aspirations.						
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17852	PH TX 7980-002	2.0	Essentials of Pharmacology and Drug Development	Martin Golkowski	T, TH	1:30PM-3:30PM	213 Skaggs Research Building
First Half Semester Lecture	<p><i>Please note you are registering for PH TX 7980-002 Faculty Consult-PhD but will be taking Essentials of Pharmacology and Drug Development.</i></p> <p>This course is designed to provide basic didactic information in the underlying concepts of pharmacology for the beginning graduate student. The primary emphasis of the course is to provide new graduate students in the Department of Pharmacology and Toxicology, or other graduate students in the biomedical sciences (Neuroscience, Biological Chemistry, or Molecular Biology programs) with fundamental knowledge about pharmacology and drug treatment. It is anticipated that students who complete this course would be able to apply these fundamental concepts to more advanced curricula and research endeavors in the disciplines of pharmacology and toxicology.</p>						

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Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
11375	BMI 6016	2.0	Biomedical Data Wrangling and Quality	Ram Gouripeddi Katherine Sward	M	5:00PM-6:30PM	TBA
Full Semester		<i>Counts as 2 electives</i>					
Lecture		<p>This course will provide an introduction to understanding general concepts of data wrangling and quality and practical application of these concepts in a variety of biomedical domains and data sources. Critical initial steps in biomedical data science and informatics include data engineering to support operations and research. These steps need to be performed with continuous efforts to assess and communicate quality of these data through their life-cycle of extraction, transformation, integration assimilation and consumption.</p> <p><u>Note – Tuition Benefit does NOT pay for differential tuition charges. Please be sure to check tuition bills and coverage.</u></p>					
Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
7263	BIOL 5210	3.0	Cell Structure and Function	Jessica Brown Matthew Mulvey	T, TH	10:45AM- 12:05PM	ASB 210
Full Semester		<i>Counts as 2 electives</i>					
Lecture		<p>The course will address advanced topics in cell biology, probing structure/function relationships in the cell. Among the topics covered are endocytosis and secretion, nuclear organization, the cytoskeleton, the mitochondria and phase separation. We will also touch on cutting edge techniques, ranging from microscopy to 'omics. A central component of the course is reading and discussion of primary research papers, giving an insight into the inner workings of modern biology.</p> <p><u>Note – Tuition Benefit does NOT pay for differential tuition charges. Please be sure to check tuition bills and coverage</u></p>					
Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
11927	BIOL 5120	3.0	Gene Expression	Michael Werner	M, W, F	10:45AM- 11:35AM	ASB 210
Full Semester		<i>Counts as 2 electives</i>					
Lecture		<p>How cells decode the information in their genomes and regulate the processing, localization, and degradation of RNA and proteins. Exploration of the role of gene expression in cell differentiation and disease. Reading from the current research literature. It is recommended that BIOL 2030 is completed prior to taking this course.</p> <p><u>Note – Tuition Benefit does NOT pay for differential tuition charges. Please be sure to check tuition bills and coverage</u></p>					
Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
-	BIOL 5315	3.0	Advanced Human Anatomy	Shawn Miller	M, W	2:00PM-3:00PM	JTB 130
Full Semester		<i>Counts as 2 electives</i>					
Lecture		<p>Design and organization of the human peripheral nervous system and its connections to the central nervous system. Establishes strong foundation for clinical neuroanatomy, incorporating solid biological principles of anatomy.</p> <p>Sections 002-003 are attached to this lecture. Students will be automatically registered for this lecture section when registering for the pertinent lab section.</p> <p><u>Note – Tuition Benefit does NOT pay for differential tuition charges. Please be sure to check tuition bills and coverage</u></p> <p><i>***Not Recommend</i></p>					