Spring 2025 Electives/Advanced Seminars

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Frequent/Recommended MB & BC Electives

Class#	Catalog#	C.H.	Course Title	Lead Instructor	Day	Time	Bldg/Room
18943	**CHEM 7150**	**2.0**	**Bioinorganic Chemistry**	**Valerie Pierre**	**TuTh**	**10:45AM-12:05PM**	**HEB 2002**
Second Half	This course provides a broad overview of metal sites in biology and is intended for students at the interface of Chemistry, Biology, Biophysics, and related disciplines. It focuses on our current understanding of the role of metals in the structure and function of proteins and nucleic acids, metalloproteins as elaborated inorganic complexes, physical methods used to study metal sites with emphasis on the synergism between model complexes and biochemical studies, and applications in medicine. Three lectures, one discussion per week for 7.5 weeks.						
Class#	**Catalog#**	**C.H.**	**Course Title**	**Lead Instructor**	**Day**	**Time**	**Bldg/Room**
19479	**CHEM 7450**	**2.0**	**Biophysical Chemistry**	**Jessica Swanson**	**MoWeFr**	**08:20AM-09:25AM**	**TBBC 2429**
First Half	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#**	**C.H.**	**Course Title**	**Lead Instructor**	**Day**	**Time**	**Bldg/Room**
10853	**CHEM 7470**	**2.0**	**Nucleic Acid Chemistry**	**Ming Hammond**	**TuTh**	**09:10AM-10:30AM**	**HEB 2010**
Second Half	*Frequent BC & MB Elective* 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. *Prerequisite: 2 semesters undergraduate organic chemistry.*						
Class#	**Catalog#**	**C.H.**	**Course Title**	**Lead Instructor**	**Day**	**Time**	**Bldg/Room**
14978	**CHEM 7580**	**2.0**	**Advanced Topics in Biological Chemistry**	**Cynthia Burrows**	**TuTh**	**09:10AM-10:30AM**	**TBBC 4630**
First Half	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. Undergraduate organic chemistry (CHEM 2310 and CHEM 2320) and biochemistry (CHEM 3510) are pre-requisites.						
Class#	**Catalog#**	**C.H.**	**Course Title**	**Lead Instructor**	**Day**	**Time**	**Bldg/Room**
10005	**H GEN 6091**	**1.5**	**Evolution & Development**	**Gabrielle Kardon & Michael Shapiro**	**TuTh**	**01:15PM-02:45PM**	**EHSEB 2962**
Second Half	*Frequent MB Elective* 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.						
Class#	**Catalog#**	**C.H.**	**Course Title**	**Lead Instructor**	**Day**	**Time**	**Bldg/Room**
11500	**H GEN 6092**	**2.0**	**Evolutionary Genetics and Genomics**	**Ellen Leffler**	**MoWeFr**	**09:30AM-10:20AM**	**EHSEB 5100C**
First Half	*Recommended MB Elective* 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.						

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Class#	Catalog#	C.H.	Course Title	Lead Instructor	Day	Time	Bldg/Room
6460	**H GEN 6421**	**1.5**	**Genes & Complex Disease**	**Lynn Jorde**	**TuTh**	**02:00 PM – 3:00 PM**	**EHSEB 2600**
First Half		*Frequent MB Elective* 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 allelicheterogeneity, phenotypic heterogeneity, gene-gene and gene-environment interactions and density of polymorphic markers. *Meets With MDCRC 6420 001*					

Class#	Catalog#	C.H.	Course Title	Lead Instructor	Day	Time	Bldg/Room
4619	**H GEN 6481**	**1.5**	**Cellular Signaling**	**Charles Murtaugh**	**MoWeFr**	**10:45AM-11:35AM**	**EHSEB 4100C**
First Half		*Frequent BC & MB Elective* 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.					

Class#	Catalog#	C.H.	Course Title	Lead Instructor	Day	Time	Bldg/Room
9605	**MDCRC 6530**	**2.0**	**Utilization of Animal Models in the Development of Clinical Research Projects**	**Anthea Letsou**	**We**	**01:00PM-02:30PM**	**EHSEB 4100C**
Full Semester		*Frequent MB Elective* 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. *Med-2-Grad Core Course Requirement*					

Class#	Catalog#	C.H.	Course Title	Lead Instructor	Day	Time	Bldg/Room
18574	**PATH 6410**	**1.5**	**Molecular Virology**	**Jarrod Johnson**	**MoWe**	**03:00PM-04:30PM**	**EHSEB 3420**
First Half		*Frequent MB Elective* Basic knowledge of molecular biology is required. The molecular biology of virus lifestyle strategies, including cell entry, nucleic acid replication, gene expression, assembly of progeny virions, interaction with the host cell, and molecular epidemiology. The course will provide both a general introduction to the diversity of virus lifestyles and a detailed analysis of several of these strategies.					

Class#	Catalog#	C.H.	Course Title	Lead Instructor	Day	Time	Bldg/Room
18575	**PATH 7320**	**1.5**	**Topics in Immunology**	**Matthew L Bettini**	**TuTh**	**01:00PM-02:30PM**	**EEJMRB 1420**
First Half		*Frequent MB Elective* 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. *This class is specifically geared toward 1st year MB students*					

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Class#	Catalog#	C.H.	Course Title	Lead Instructor	Day	Time	Bldg/Room
8583	**PHCEU 7011**	**3.0**	**Fundamentals of Pharmacokinetics**	**James Herron, Daniel Malone, & Shawn Owen**	**WeFr**	**10:30AM-12:00PM**	**EHSEB 4100B**
Full Semester	*Frequent BC Elective; Counts as 2 electives* 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. *Prerequisite: PHCEU 7010, or Special Permission from Instructor*						
Class#	**Catalog#**	**C.H.**	**Course Title**	**Lead Instructor**	**Day**	**Time**	**Bldg/Room**
19182	**PH TX 7113**	**2.0**	**Essentials of Pharmacology**	**Farzana Alam & Martin Golkowski**	**TuTh**	**12:30 PM – 2:30 PM**	**TBA**
First Half	This course will introduce graduate students to the basic principles of pharmacology and drug development. The course will focus on the role of small molecule drug structures, ligand binding kinetics, and receptor physiology, including ion channels, G-protein coupled receptors (GPCRs), and protein kinases, and others, in relation to biological (side)effects of drugs. Furthermore, 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, current computational tools to calculate pharmacokinetic parameters, and pharmacogenomics. Finally, the course will discuss cutting edge aspects of pharmacology research and pharmaceutical industry applications in precision medicine, the omics sciences and novel, up-and-coming small molecule drug classes like molecular glues and proteolysis-targeting chimeras (PROTACs)and target classes like transcription factors and epigenetic regulators. This course is designed to complement PHARM 6500.						

Additional Electives

Class#	Catalog#	C.H.	Course Title	Lead Instructor	Day	Time	Bldg/Room
1874	**ANAT 7690**	**3.0**	**Scientific Lecturing and Writing**	**Kurt Albertine**	**TBA**	**TBA**	**TBA**
Full Semester	*Counts as 2 electives* 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#**	**C.H.**	**Course Title**	**Lead Instructor**	**Day**	**Time**	**Bldg/Room**
19186	**BIO C 7100**	**1.0**	**Peptide and Protein Design**	**Michael Kay**	**TBA**	**TBA**	**TBA**
Second Half	Seminar: Student and faculty discussion of advanced-level topics not covered in formal courses.						
Class#	**Catalog#**	**C.H.**	**Course Title**	**Lead Instructor**	**Day**	**Time**	**Bldg/Room**
10489	**BIOL 5120**	**3.0**	**Gene Expression**	**Michael Werner**	**MoWeFr**	**10:45AM-11:35AM**	**ASB 210**
Full Semester	*Counts as 2 electives* 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. ***Note – Tuition Benefit does NOT pay for differential tuition charges. Please be sure to check tuition bills and coverage.***						
Class#	**Catalog#**	**C.H.**	**Course Title**	**Lead Instructor**	**Day**	**Time**	**Bldg/Room**
6644	**BIOL 5210**	**3.0**	**Cell Structure Function**	**Nick Vierra**	**TuTh**	**10:45AM-12:05PM**	**AEB 320**
Full Semester	*Counts as 2 electives* 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, they 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.						

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12883	**BIOL 5255**	**4.0**	**Prokaryotic Genetics (Class and Lab)**	**Kelly Hughes**	**MoWe**	**12:55PM-01:45PM & Lab 02:00PM-03:55PM**	**JTB 110 & JTB 340**
Full Semester		This course requires registration for a lab and/or discussion section. Students will be automatically registered for this lecture section when registering for the pertinent lab and/or discussion section. The course fee covers digital course materials through the Inclusive Access program. Students may request to opt out here: https://portal.verba.io/utah/login A project-oriented lecture/laboratory on use of experimental and analytical tools of modern genetics using bacteria and their viruses. It is recommended that BIOL 2020 and BIOL 2030 be completed prior to taking this course. ***Note – Tuition Benefit does NOT pay for differential tuition charges. Please be sure to check tuition bills and coverage.***				
Class#	**Catalog#**	**C.H.**	**Course Title**	**Lead Instructor**	**Day**	**Time**	**Bldg/Room**
19115	**BIOL 5920**	**3.0**	**Advanced Euk. Genetics**	**Nitin Phadnis**	**MoWeFr**	**11:50AM-01:45PM**	**JTB 230**
First Half		This course builds upon BIOL 2030, and is designed to give students a deeper understanding of the experimental basis of modern eukaryotic genetics. Topics to be covered include: chromosome recombination and segregation; DNA mutation and repair: gene expression and gene disruption; finding and characterizing mutants; analyzing gene function in time and space; gene interactions and pathways. ***Note – Tuition Benefit does NOT pay for differential tuition charges. Please be sure to check tuition bills and coverage.***				
Class#	**Catalog#**	**C.H.**	**Course Title**	**Lead Instructor**	**Day**	**Time**	**Bldg/Room**
14696	**BIOL 5960**	**3.0**	**Cell Biol & Microscopy**	**Wayne Davis**	**TuThFr**	**Th/12:25PM-01:45PM TuFr/12:55PM-03:55PM**	**HEB 2002 BIOL 180**
Full Semester		Topics of special interest taught when justified by student and faculty interest. Content varies from year to year. ***Note – Tuition Benefit does NOT pay for differential tuition charges. Please be sure to check tuition bills and coverage.***					
Class#	**Catalog#**	**C.H.**	**Course Title**	**Lead Instructor**	**Day**	**Time**	**Bldg/Room**
10490	**BIOL 6500**	**3.0**	**Adv Stat Model Biolgst**	**Frederick Adler & David Bowling**	**MoWe**	**02:00PM-03:30PM**	**JTB 320**
Full Semester		*Counts as 2 electives* 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.					
Class#	**Catalog#**	**C.H.**	**Course Title**	**Lead Instructor**	**Day**	**Time**	**Bldg/Room**
7927	**BIOL 6530**	**3.0**	**Biological Chemistry**	**David Blair & Martin Horvath**	**TuTh**	**10:45AM-12:05PM**	**HEB 2008**
Full Semester		*Counts as 2 electives* Structure and function of biomolecules, metabolism, and regulation.					
Class#	**Catalog#**	**C.H.**	**Course Title**	**Lead Instructor**	**Day**	**Time**	**Bldg/Room**
4850	**BMI 6105**	**3.0**	**Stats for Biomed Info**	**Greg Stoddard**	**Online**		
Full Semester		This class covers a wide range of statistical methods, from basic statistics to advanced regression methods for repeated measurements, and developing and validating prognostic and diagnostic tests. The emphasis is on application and practice, using the statistical software Stata, rather than theory and formulas. Statistical programming, computer graphics, Monte Carlo simulation, and bootstrap simulation in Stata is taught. Epidemiology principles, such as confounding, bias, and causation are also covered. (Required for all biomedical informatics graduate students.) ***Note – Tuition Benefit does NOT pay for differential tuition charges. Please be sure to check tuition bills and coverage.***				

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12183	**BMI 6114**	**3.0**	**Deep Learning in BioMed**	**Abdulmalek Al-Gahmi**	**TuTh**	**05:00PM-06:30PM**	**TBA**
Full Semester		This course is an applied introduction to deep learning, a branch of machine learning, that aims to understand and practice the development and application of modern neural networks. In that vein, the course will provide students with a working knowledge of deep learning fundamentals that presents a start point for using more advanced techniques in their future careers. The course will start by reviewing and implementing the main mathematics, statistics, and machine learning principles that will be required during the course. Then, the students will learn how deep learning algorithms extract layered high-level representations of data in order to optimize feature learning, cluster analysis, and classification machine learning tasks. Hands-on activities will provide students with the experience of implementing deep learning architectures for mainly biomedicine applications. ***Note – Tuition Benefit does NOT pay for differential tuition charges. Please be sure to check tuition bills and coverage.***				
Class#	**Catalog#**	**C.H.**	**Course Title**	**Lead Instructor**	**Day**	**Time**	**Bldg/Room**
12077	**CHEM 7020**	**2.0**	**Intro Spectroscopy I**	**Michael Morse**	**MoWeFr**	**11:00AM-12:05PM**	**HEB 2010**
First Half		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.					
Class#	**Catalog#**	**C.H.**	**Course Title**	**Lead Instructor**	**Day**	**Time**	**Bldg/Room**
18942	**CHEM 7080**	**2.0**	**Chemical Dynamics**	**Peter Armentrout**	**MoWeFr**	**08:20AM-09:25AM**	**HEB 2002**
Second Half		This course provides an introduction into the details of how chemical reactions occur. Experimental methods for studying chemical dynamics are surveyed. This course covers topics useful for chemists, physicists, and engineers.					
Class#	**Catalog#**	**C.H.**	**Course Title**	**Lead Instructor**	**Day**	**Time**	**Bldg/Room**
10503	**CHEM 7130**	**2.0**	**Solid-State Chemistry**	**Luisa Whittaker-Brooks**	**MoWeFr**	**09:35AM-10:40AM**	**HEB 2006**
First Half		This course is intended for graduate students in Chemistry, Physics, and Material Science & Engineering with a need to understand the fundamental aspects of solid-state materials and their properties. A broad overview covering the unique aspect of the synthesis, characterization, structure and properties with respect to solids are provided.					
Class#	**Catalog#**	**C.H.**	**Course Title**	**Lead Instructor**	**Day**	**Time**	**Bldg/Room**
10820	**CHEM 7160**	**2.0**	**Organometallic Chem I**	**Thomas Richmond**	**TuTh**	**09:10AM-10:30AM**	**HEB 2010**
First Half		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.					
Class#	**Catalog#**	**C.H.**	**Course Title**	**Lead Instructor**	**Day**	**Time**	**Bldg/Room**
15032	**CHEM 7210**	**2.0**	**Organic Synthesis II**	**Andrew Roberts**	**MoWeFr**	**11:00AM-12:05PM**	**HEB 2010**
Second Half		This course is largely focused on understanding strategies and tactics used in the synthesis of complex molecules. The mechanisms of common reactions and named organic reactions will also be studied as a means to understand functional group tolerance and compatibility and how they are strategically applied. These discussions will be framed primarily in the context of the synthesis of natural products and other medicinally relevant organic compounds.					
Class#	**Catalog#**	**C.H.**	**Course Title**	**Lead Instructor**	**Day**	**Time**	**Bldg/Room**
7731	**CHEM 7300**	**2.0**	**Polymers: Chemistry**	**Ilya Zharov**	**TuTh**	**10:45AM-12:05PM**	**TBA**
First Half		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.					

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18940	**CHEM 7530**	**2.0**	**Molecular Simulations**	**Michael Gruenwald**	**TuTh**	**10:45AM-12:05PM**	**HEB 2010**
Second Half		Molecular simulations and modeling are playing an increasingly important role in chemistry, for their power to bridge the way from the microscopic structure and interactions to macroscopic properties that are key for the modeling and design of new materials and processes. The purpose of this course is to educate students in the foundation and practice of classical Molecular Dynamics and Monte Carlo simulations. Through lectures, laboratory practice, review of recent literature and a final laboratory project, the students learn how to plan, execute and interpret molecular simulation experiments and to read critically the literature involving molecular simulations applied to chemistry, molecular physics and molecular biology.					
Class#	**Catalog#**	**C.H.**	**Course Title**	**Lead Instructor**	**Day**	**Time**	**Bldg/Room**
13006	**NEUSC 6050**	**4.0**	**Principles of Systems Neuroscience**	**Adam Douglass & Jim Heys**	**TuThFr**	**10:45AM-12:05PM**	**EHSEB 3430**
Full Semester		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.					
Class#	**Catalog#**	**C.H.**	**Course Title**	**Lead Instructor**	**Day**	**Time**	**Bldg/Room**
2959	**NUIP 5850**	**1.0-3.0**	**Selected Topics-Survey of Cardiovascular, Muscle, Pulmonary Physiology**	**David Symons**	**MoWe**	**9:40AM-11:40AM**	**EHSEB 2938**
Second Half		(aka NUIP 6702- Survey of Cardiovascular, Muscle, Pulmonary Physiology) Survey of major organ systems, their function, and integrative function in the body. Lectures, assigned reading, and team-based instruction is used with subject matter experts delivering content of each module.					
Class#	**Catalog#**	**C.H.**	**Course Title**	**Lead Instructor**	**Day**	**Time**	**Bldg/Room**
12666	**PATH 7360**	**1.5**	**Advanced Immunology**	**Dean Tantin**	**TuTh**	**02:00PM-03:30PM**	**EEJMRB 2420**
First Half		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.					
Class#	**Catalog#**	**C.H.**	**Course Title**	**Lead Instructor**	**Day**	**Time**	**Bldg/Room**
7275	**PHCEU 6020**	**3.0**	**Biomaterials**	**Michael Yu**	**TuTh**	**10:45AM-12:05PM**	**TBA**
Full Semester		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.					
Class#	**Catalog#**	**C.H.**	**Course Title**	**Lead Instructor**	**Day**	**Time**	**Bldg/Room**
12320	**PHTX 7690**	**2.0**	**Professional Skills Development**	**Kristen Keefe & Kyle Turner**	**W**	**3:00PM-5:00PM**	**4100C HESB**
Full Semester		In this course, participants will enhance their leadership and communication abilities through the development of four key professional skill areas: technical writing, communication styles and rhetorical devices, leadership development, career development support. This course is designed to equip trainees with the tools and skills necessary for professional success.					

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