

Spring 2017 Electives/Advanced Seminars

View Course Schedules online: <https://student.apps.utah.edu/uofu/stu/ClassSchedules/main/1174/>

*Advanced Course/Seminar, or 1-credit courses: Not available to first-year students unless otherwise noted.

Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
12224	ANAT 7750	3.0	Developmental Neurobiology	Megan Williams	T, Th F	9:40-10:30 10:45-11:35	HSEB 3420

Full Semester

Frequent MB Elective (Counts as 2 electives)

Cellular and molecular biology of nervous system development. Lectures by diverse faculty cover major processes involved in the assembly of a functional nervous system. Students present an original journal article related to a lecture topic and write a 4-page mini-grant.

Cross listed with NEUSC 7750

Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
4543	BIO C 6600	1.5	Regulation of Metabolism	Janet Lindsley	T, Th	9:30-11:00	HSEB 2908

Second Half
Semester

Biochemistry Research Track Course

Frequent MB Elective

Prerequisite: BIOL 3520 or CHEM 3520 or equivalent.

This half-semester course will begin with a review of carbohydrate and lipid metabolic pathways, with an emphasis on an integrated understanding the pathways and what is known about their regulation. The course will progress to an in-depth analysis of current research in specific areas of nutritional sensing and metabolic regulation.

9:30-11:00 am - starts 10 min earlier than usual class times

Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
4570	BIO C 7100	1.0	Metabolism	Jared Rutter	TBA	TBA	TBA

Full Semester

Advanced Seminar: Student and faculty discussion of advanced-level topics not covered in formal courses. Contact Jared Rutter, rutter@biochem.utah.edu, for course info and permission to register.

Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
10539	BIOEN 6770	3.0	Genomic Signal Processing	Orly Alter	M, W	1:25-2:45	LCB 115

In this course, for graduate and advanced undergraduate students from the Colleges of Engineering, Sciences and Pharmacy and the School of Medicine, we will discuss: (a) Technologies for high-throughput acquisition of molecular biological data on genomic and proteomic scales, such as DNA and protein arrays; (b) Databases and large-scale datasets generated by national and international consortia as well as individual research groups using these technologies; (c) Mathematical analysis and modeling of these data using ideas from signal processing, numerical computation and information systems; and (d) Biological and medical predictions made by these analyses and models, their experimental tests and their applications toward better understanding of basic biology as well as improved medical diagnosis treatment and drug design.

Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
15366	BIOL 6530	3.0	Biological Chemistry	Martin Horvath Toto Olivera	T, Th	10:45-12:05	HEB 2008

Full Semester

Structure and function of biomolecules, metabolism, and regulation.

Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
10287	BIOL 7962	3.0	Seminal Papers in Biology	Kent Golic	M, W	4:00-5:30	ASB 504

Full Semester

This course focuses on papers that have made significant and lasting contributions to biological understanding, owing to their intellectual elegance, significance of discovery, or technical advancement. Topics vary according to instructors, but may include genetics, cell biology, biochemistry, development and evolution. The course is organized around student presentations and discussion, with guidance and input from Instructors.

The course is intended for graduate students in the biological sciences, but advanced undergraduates may also enroll with permission.

The course is organized around directed readings and in-class discussion. There are no exams or writing assignments.

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Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
8437	BIOL 7964	1-5	Advanced Topics in Ecology and Evolution	Phyllis Coley	M, W	3:30-5:30	ASB 304

Full Semester This course covers a selected set of significant, influential and exciting topics in ecological, evolutionary, organismal and environmental biology. The course will introduce the students to the faculty, how they think and what they think is interesting and exciting. The course also will promote intellectual and social interactions among all members of the EEOB group. There will be assigned readings, but no exams or papers. Grading will be based on attendance and participation.
First year students need to be registered for 1.5 credits.

Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
17503	BLCHM 6430	1.5	Structural Methods	Chris Hill David Goldenberg	M, W, F	9:40-10:30	HSEB 5100D

First Half Semester **Structural Biology / Biophysics Research Track Course**
Frequent MB and BC Elective

This course provides an integrated approach to the applications of NMR and X-ray crystallography in structural biology. Topics covered include: basic NMR theory, and the application of 2D and 3D NMR methods for the determining protein and RNA structures; methods of macromolecular crystallization and crystal structure determination.

Offered every other year.

Contact Elizabeth Loertscher, eloertscher@genetics.utah.edu for registration code.

Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
7551	BMI 6105	3.0	Statistics for Biomedical Informatics	Greg Stoddard	TBA	TBA	Online

Full Semester **Genome Science Program Core Requirement**
This course covers a range of statistical methods from classical hypothesis testing to more modern computational methods. The emphasis is on application and practice rather than extensive theoretical derivations. Simulation is used to illustrate properties of distributions, tests and methods. Students are expected to have access to a personal computer and the "R" environment for statistics and computation. (Required for all biomedical informatics students.)

This is an online course, which does not meet in-class. For additional information, please visit <http://uonline.utah.edu> or call 585-5959. \$60.00 fee not covered by Tuition Benefit.

Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
13672	BMI 6950-004		Applied Machine Learning in Biomedical Informatics	Jeffrey Ferraro	Tuesday	4:10-6:00	HSEB 5100C

Full Semester **Genome Science Program Core Requirement**
Prerequisites: Graduate standing at the University of Utah, or permission of instructor. Ability to program/computer science background; undergraduate level statistics and probability course; basic understanding of Linear Algebra; BMI 6950 Intro to Computer Programming or proficiency coding in python. This section requires a permission code from the department for non-BMI students.
Machine Learning is all about programming computers so they can learn from data replacing the need for humans to write custom code to address a certain class of problems. It is all about finding patterns in data. One of the most important aspects of machine learning is generalization so that the learners we create from historical data can effectively perform on data evaluated in the future. This will be a central theme that we will continually be addressing and evaluating throughout the course. This course will cover the applied fundamentals of machine learning through hands-on exercises along with lectures on some of the theoretical underpinnings differentiating learning approaches. Topics in feature selection, supervised learning, unsupervised learning, online learning, and reduction methods will be covered along with best practice predictor evaluation methods. The course will address the unique issues faced when applying machine learning to clinical and biomedical problems. Students will be expected to program real-world solutions using python and popular machine learning software packages like Weka.

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Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
8317	CHEM 6810	3.0	Nanoscience: Where Biology, Chemistry and Physics Intersect	Marc Porter	T, Th	9:10-10:30	LCB 219

Full Semester An introduction to the emerging fields of nanoscience and nanotechnology. Concepts from biology, chemistry and physics will be used to explore the special features of phenomena at the nanometer scale, and current developments in the design and construction of nanoscale devices will be discussed. This class will have an additional meeting TBA.

Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
17466	CHEM 7080	2.0	Chemical Dynamics	Peter Armentrout	M, T, W, F	9:40-10:30	HEB 2002

Second Half Semester 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 #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
12225	CHEM 7150	2.0	Bioinorganic Chemistry	Matt Kieber-Emmons	M, W, Th, F	9:40-10:30	HEB 2010

First Half Semester **Frequent BC Elective**
Meets with CHEM 5150. 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 #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
14139	CHEM 7470	2.0	Nucleic Acid Chemistry	Cynthia Burrows	M, W, Th, F	8:35-9:25	LS 107

First Half Semester **Biochemistry Research Track Course**
Frequent MB Elective
Prerequisite: 2 semesters undergraduate organic chemistry.
Three lectures, one discussion per week for 7.5 weeks. 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.

Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
13198	CHEM 7530	2.0	Molecular Simulations	Valeria Molinero	M, W, Th, F	8:35-9:25	HEB 2010

Second Half Semester 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.

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Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
16792	HGEN 6040	1.5	Concepts of Developmental Biology	Gillian Stanfield	M, W, F	1:00-2:00	HSEB 2958

First Half
Semester

Frequent MB Elective

This introductory, primarily lecture-based course will provide a broad overview of the genetic and cellular framework of developmental biology, drawing on both classic and current literature. Specific topics include pattern formation, cell fate specification, differentiation, morphogenesis, stem cells, and reprogramming. Registration is limited to 30 students.

Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
18145	HGEN 6060	2.0	Applied Computational Genomics	Aaron Quinlan	T, Th	9:10-10:30	HSEB 2948

Full Semester

Genome Science Program Core Requirement

Prerequisites: Complete "Learn the Command Line" from codecademy.com.

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.

New in 2017

Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
16793	HGEN 6091	1.5	Evolution & Development	Gabrielle Kardon	T, Th	1:15-2:45	HSEB 2938

Second Half
Semester

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 #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
10530	HGEN 6421	1.5	Genetics of Complex Diseases	Lynn Jorde	W	1:30-3:30	HSEB 2969

First Half
Semester

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 allelic heterogeneity, phenotypic heterogeneity, gene-gene and gene-environment interactions and density of polymorphic markers. Cross-listed with MDCRC 6420

Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
7075	HGEN 6481	1.5	Cell Biology II	Charles Murtaugh	M, W, F	10:45-11:35	TBA

First Half
Semester

Frequent 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.

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Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
6875	MD CH 7891	2.0	Fundamentals of Drug Discovery & Design	Eric Schmidt	M, W, F	1:00-2:00	HSEB 4100C

First Half
Semester

Chemical Biology / Medicinal Chemistry Research Track Course

In this half-semester course, we cover the basics of drug development and evaluation. The principles of pharmacokinetics, ADME and structure-activity relationships are emphasized. Students will leave the class with the ability to discuss major trends in drug discovery and development, understand the structure-activity relationships and mechanisms of action of major drug classes and appreciate the drug discovery and development process from a chemist's perspective.

Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
8480	MD CH 7895	2.0	Understanding Therapeutically Relevant Biomolecules	Amy Barrios	M, W, F	1:00-2:00	HSEB 4100C

Second Half
Semester

Chemical Biology / Medicinal Chemistry Research Track Course

In this half-semester course, we cover several classes of therapeutically relevant biomolecules, including nucleic acids, peptides, carbohydrates, natural products and synthetic molecules. Key aspects of each class of molecules will be discussed, with an emphasis on recent scientific developments in the field. Students will leave the class able to explain the therapeutic relevance of several classes of molecules, analyze the primary literature and design experiments to test key questions at the interface between chemistry and biology.

Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
10634	MDCRC 6150	2.0	Foundations in Personalized Health Care	Joshua Schiffman	M	5:30-7:00	HSEB 4100B

Full Semester

Advanced Seminar: Personalized Health Care is the tailoring of medical treatment to the individual characteristics of each patient. This course will review the fundamental elements of Personalized Health Care, discuss relevant case studies of preventive and therapeutic applications of Personalized Health Care, and explore future developments. Students will also have the opportunity to devise ways in which Personalized Healthcare can be advanced locally, nationally and globally. Enrollment cap is 65.

Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
2483	NEUSC 6050	4.0	Systems Neuroscience: Functioning of the Nervous System	Greg Clark	T, Th F	10:45-12:05 12:55-1:45	HSEB 2948

Full Semester

(Counts as 2 electives)

Understanding how the brain works is one of the deepest and most exciting challenges confronting modern science. This course will explore systems-level functioning of the nervous system, beginning with relatively concrete issues of sensory coding and motor control, and expanding into more abstract, but equally important, higher-order phenomena, such as language, cognitive and mood disorders, states of arousal, and experience-dependent modifications of neuronal operations.

Cross-listed with BIOEN 6430

Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
11888	NEUSC 7750	3.0	Developmental Neurobiology	Megan Williams	T, Th F	9:40-10:30 10:45-11:35	HSEB 3420

Full Semester

Frequent MB Elective (Counts as 2 electives)

Cellular and molecular biology of nervous system development. Lectures by diverse faculty cover major processes involved in the assembly of a functional nervous system. Students present an original journal article related to a lecture topic and write a 4-page mini-grant.

Cross listed with ANAT 7750

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Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
3748	ONCSC 6500-001	1.5	Molecular Mechanisms of Cancer	Sean Tavtigian	M, W, F	3:00-4:00	HCI 4 th S Conf

Second Half
Semester

Frequent MB and BC Elective

Prerequisites: Concurrent enrollment or equivalent 1st year Cell Biology, Molecular Biology and Genetics. 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. The course is designed for graduate students and post-doctoral fellows in basic science departments with an interest in modern principles and practice of oncology, and complements the Clinical Biology of Cancer course offered in alternating years.

Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
10448	ONCSC 6520-001	2.0	Physiology & Medicine for the Molecular Biologist	Dean Li Kevin Whitehead	M, W, F	9:00-10:30	HSEB 3515B

First Half
Semester

Med-2-Grad Core Course Requirement

Frequent MB Elective

The goal of this course is to provide graduate students in the basic sciences with 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, organs and whole animals.

This course is aimed for students interested in:

1. Gaining an understanding of the broad implications of their research and basic science.
2. Learning how their focus in molecular mechanisms translates into medical interventions.
3. Obtaining a foundation in anatomy and physiology that is critical for understanding how to characterize genetically engineered animal models
4. Preparing themselves scientifically for careers in biotech or pharma industry.

We will teach the anatomy, physiology and pathophysiology relevant to a given organ system (heart, lung, kidney etc.). The interaction between molecular mechanisms and medicine will be emphasized. Sections are in one to three 1.5 hour lectures. Lectures will include up-to-date molecular details of interest and relevance to this audience. We will emphasize class participation.

All graduate student, post doctoral fellows and basic science faculty are welcome.

Both this course and ONSC6520-002 are required for students interested in the Med into Grad Program and are organized to complement one another.

First-year students please note:

- 1) Take section 001 alone and be credited with one Program elective (typical half-semester elective)
- 2) Take sections 001 and 002 and be credited with two Program electives (as we do with other full-semester courses)
- 3) Take section 002 alone, but it will not count towards a Program elective requirement
- 4) Need to be registered for 2.0 credits for each section

Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
9512	ONCSC 6520-002	2.0	Utilization of Animal Models to Study Clinical Disease	Trudy Oliver Rod Stewart	W	1:00-2:30	HSEB 3515B

Second Half
Semester

Med-2-Grad Core Course Requirement

Frequent MB Elective

This course provides an introduction to organisms (yeast, worms, flies, chicks, frogs, fish and mice) used experimentally to dissect the genetic basis of human disease. The material is intended for medical fellows preparing their first research proposals and for graduate students with limited exposure to the genetics of model systems. Both this course and ONSC6520-001 are required for students interested in the Med into Grad Program and are organized to complement one another.

Lectures focus on techniques of gene modification in vivo, including classical phenotypic selection, anti-sense RNA, gene over-expression, lineage tracing, homologous recombination and CRISPR/Cas-directed modification with multiple examples from current clinical and laboratory studies.

Each student is expected to become familiar with a specific human medical disorder and to prepare the outline of a grant proposal investigating that subject. The final examination is the oral defense of that proposal.

First-year students please note:

- 1) Take section 001 alone and be credited with one Program elective (typical half-semester elective)
- 2) Take sections 001 and 002 and be credited with two Program electives (as we do with other full-semester courses)
- 3) Take section 002 alone, but it will not count towards a Program elective requirement
- 4) Need to be registered for 2.0 credits for each section

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Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
18427	ONCSC 7700-011	1.0	Emerging Molecular Technology	Matt VanBrocklin	Th	TH 10-12	4 th Conf HCI

Second Half Semester
 Advanced Seminar: This course will focus on introducing emerging molecular biological techniques used for cloning, gene expression and genome editing. Topics will include Gibson, Golden Gate, Gateway and Flp-In cloning, Viral vectors, RNAi and CRISPR mediated genome editing. The goal of this course is to enable students to apply these technologies in solving unique research project challenges.
 : This course will focus on introducing emerging molecular biological techniques used for cloning, gene expression and genome editing. Topics will include Gibson, Golden Gate, Gateway and Flp-In cloning, Viral vectors, RNAi and CRISPR mediated genome editing. The goal of this course is to enable students to apply these technologies in solving unique research project challenges.

Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
18740	PATH 6410	1.5	Molecular Virology	Vicente Planelles	M, T, W	1-2:30	EEJMRB 1200

Second Half Semester
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 #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
14137	PATH 6910	1.5	Noncoding RNAs and Immune Responses	Ryan O'Connell	T, Th	2:00-3:30	EEJMRB 4420

Full Semester
 Advanced Seminar: This course is a mix of faculty lectures and student discussions of primary research papers. Topics are selected from current primary literature sources on subjects relevant to the focus of the class, and these will include different types of long and short noncoding RNAs (e.g. miRNAs and lincRNAs) and how they contribute to inflammatory responses. Classes will be lead by a small team of faculty. Basic knowledge of noncoding RNAs and mammalian immunity will be assumed.

Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
15361	PED 5750	1.5	Genomic Analysis I	Clinton Mason	Th	2:30-3:45	HSEB 1750

Full Semester
 Provides comprehensive instruction on the analysis of genomic data. An overview of basic statistics, study design, genomic technologies, and computational software will be provided in addition to current best practices in the analysis of genomic data. Genomic Analysis I will focus on analysis and detection of variants and mutations from next generation sequencing data (whole genome sequencing, whole exome sequencing, and targeted panel sequencing) as well as the analysis of genomic copy number data.

Conflicts with Lit Review and Grant Prep T Th 3-5

Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
11721	PH TX 6720	1.0	Developments in Neuropharmacology	Karen Wilcox	TBA	TBA	TBA

Full Semester
Advanced Seminar: This course will review current advances in the field of neuropharmacology through weekly discussions of research articles.

Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
12847	PHCEU 6020	3.0	Biomaterials	Michael Yu	T, Th	10:45-12:05	WEB 2460

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.

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Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
18150	PHCEU 7011	3.0	Fundamentals of Pharmacokinetics	Shawn Owen	M, W, Th	11:00-11:50	HSEB 2680

Full Semester
 Prerequisite: PHCEU 7010, or Special Permission from Instructor.
 Meets with PHARM 5121. 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.

Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
16903	PHCEU 7020	4.0	Physical Chemistry of Biomedical and Drug Delivery	David Grainger	W, Th	2:00-4:00	SRI 2290

Full Semester
 Prerequisite: Graduate student status or instructor consent and CHEM 7050.
 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.
Conflicts with Lit Review and Grant Prep T, Th 3-5

Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
16904	PHCEU 7040	4.0	Biotechnology	James Herron	M, F	9:40-11:45	SRI 2290

Full Semester
Frequent BC Elective (Counts as 2 electives)
 Prerequisite: Graduate student status or instructor consent and one differential equations course.
 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.

Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
16958	PHYS 6210	3.0	Optics in Biology	Saveez Saffarian	T, Th	12:25-1:45	LS 111

Full Semester
Structural Biology / Biophysics Research Track Course
Frequent BC Elective (Counts as 2 electives)
 Prerequisites: "B-" or better in (PHYS 2210 AND PHYS 2220).
 The use of optics in biology has evolved from the simple light microscope used by Darwin to the complex cryo-electron and live cell high resolution microscopes used today. With all these advances it can now be argued that we stand at the dawn of quantitative biology and optics provides an essential tool in this pursuit. This course is designed to give students a good understanding of physics involved in advanced optics while focusing their attention on the biological problems amenable to these techniques. Students with backgrounds in biology, chemistry or physics are equally encouraged however knowing algebra is a requirement for taking this course. Each section of the course would deal specifically with a special kind of microscopy followed with a case study in a biological problem that is most amenable to the use of the techniques discussed.

Class #	Catalog #	Cr Hrs	Course Title	Lead Instructor	Day	Time	Bldg/Room
14674	PHYS 6231	2.0	Biological Motors	Michael Vershinin	T, Th	2:00-3:20	WBB 617

First Half Semester
Structural Biology / Biophysics Research Track Course
 This course will provide an overview of the structure and biological function of microtubule and actin-based motors (including topics of motor regulation,). Students with back grounds in biology or physics are equally encouraged. The class will outline the biological context of motor activity, discuss motor families and details of their mechano-chemical activity as well as related advanced topics.
 Cross-listed with PHYS 6230 which is a full term course.
Conflicts with Lit Review and Grant Prep T, Th 3-5