

## COURSE DESCRIPTION

## 6 Credit Course

Teaching Assistants: Seth Berger &amp; Amrita Sarkar

This active-learning course will introduce core biochemical, cell biological and molecular mechanisms together with basic bioinformatic and systems biology concepts and applications in the context of human biomedical research. The emphasis is 'topdown', beginning with a pathophysiological condition studied from a clinical perspective and moving towards explication of the molecular and metabolic logic, regulatory circuits and cell and tissue specific properties that distinguish the disease and normal state. The goals of this course are to provide inquisitive, self-directed students with an appreciation of the complexity of biological systems across scales and to give insight into pathophysiology as a basis for scientific enquiry and development of new therapeutic strategies. Students will be guided to relevant textbook material and current reviews, and will also participate in analyses of primary journal articles to enhance their study of scientific method and to illustrate a variety of experimental and computational approaches to contemporary translational biomedicine. Problem sets and the methodologies for handling large data sets, including epidemiological and genetic data, will be introduced.

## COURSE FEATURES

- Integrates molecular biology with physiology and systems biology
- Translational perspective
- Active-learning
- Problem set based
- Integrated journal club

### Course Modules

#### 1. Introduction to Systems Biomedicine

#### 2. Diabetes

#### 3. Cancer

#### 4. Renal Disease

#### 5. Drug Abuse

## SCHEDULE

Location: Annenberg Building, 19<sup>th</sup> Floor, Room 19-50

DATE	DAY	TIME	MODULE	FACULTY	TOPIC	
Aug 24	Mon	12 – 1:30pm	Introduction	Krulwich	Introduction to Systems Biomedicine and Introduction to Principles of Metabolism	
Aug 27	Thurs	12 – 2pm	Introduction	Iyengar	Protein Structure	
Aug 28	Fri	12 – 2pm	Introduction	Devi	Enzyme Kinetics/Receptor Binding <b>Small problem set distributed</b>	
Aug 31	Mon	<b>Small problem set due by 11am</b>				
Aug 31	Mon	12 – 2pm	Introduction	Sobie/TAs	Introduction to MatLab	
Sep 1	Tues	12 – 1pm	Introduction	Hirsch	Cell Cycle Introduction	
Sep 1	Tues	1 – 3pm	Introduction	Sobie/TAs	MatLab Workshop: Simulation of Enzyme Kinetics	
Sep 3	Thurs	12 – 2pm	Introduction	Hanss	Physiological Homeostasis	
Sep 8	Tues	9 – 11am	Introduction	Bleker	Transcription and Epigenetics	
Sep 9	Wed	10 – 12pm	Introduction	Sealfon	Microarrays: Approaches, Problems and Potential	
Sep 10	Thurs	9 – 11am	Introduction	Hirsch	Genetics <b>Final problem set distributed</b>	
Sep 11	Fri	<b>Final problem set due by 12pm</b>				
Sep 14	Mon	10 – 12pm	Diabetes	LeRoith	Overview of Diabetes	
Sep 15	Tues	10 – 11am	Diabetes	Krulwich	Glucose Metabolism	
Sep 16	Wed	10 – 1pm	Diabetes	Krulwich	Glucose/Fatty Acid Metabolism and OXPHOS/Journal Club	
Sep 17	Thurs	9 – 11am	Diabetes	Ma	Insulin Secretion/Journal Club	
Sep 21	Mon	9 – 11am	Diabetes	Looker	Diabetes Genes/Journal Club	
Sep 21	Mon	11 – 12pm	Diabetes	TA Session		
Sep 22	Tues	9 – 11am	Diabetes	LeRoith	RTK Signaling	
Sep 23	Wed	9 – 10am	Diabetes	Caplan	ER Stress	
Sep 23	Wed	10 – 11am	Diabetes	Cagan	Drug Discovery/Journal Club	
Sep 24	Thurs	10 – 11am	Diabetes	TA Session	<b>Small problem set distributed</b>	
Sep 29	Tues	<b>Small problem set due by 8pm</b>				
Sep 30	Wed	9 – 11am	Diabetes	Buettner	Organ Cross-talk in Pathogenesis of Diabetes/Journal Club	
Oct 1	Thurs	9 – 11am	Diabetes	LeRoith	Drug Strategies <b>Final problem set distributed</b>	
Oct 2	Fri	See note	Diabetes	TA Session (note: time to be scheduled with class input)		
Oct 5	Mon	<b>Final problem set due by 8pm</b>				
Oct 6	Tues	9 – 11am	Cancer	Hirsch	Growth Control: Cell Cycle and Apoptosis	
Oct 7	Wed	9 – 10:30am	Cancer	Hirsch/Sobie	MatLab: Modeling the Cell Cycle	
Oct 8	Thurs	9 – 11am	Cancer	Cagan	Signaling Pathways in Cancer	
Oct 9	Fri	9 – 11am	Cancer	Pfleger	Use of Model Organisms in Studying Cancer <b>Small problem set distributed</b>	
Oct 9	Fri	1 – 2pm	Cancer	TA Session		
Oct 12	Mon	<b>Small problem set due by 8pm</b>				
Oct 13	Tues	9 – 11am	Cancer	Hall	Cancer Pathology	
Oct 14	Wed	9 – 11am	Cancer	Martignetti	Cancer Genetics	
Oct 15	Thurs	9 – 10:30am	Cancer	Hirsch	Cancer Biology/Journal Club	
Oct 19	Mon	9 – 11am	Cancer	Kaufman	Chemotherapeutics	
Oct 20	Tues	9 – 11am	Cancer	Skobe	Metastasis	
Oct 21	Wed	9 – 11am	Cancer	Teitelbaum	Cancer Epidemiology	
Oct 22	Thurs	1 – 2pm	Cancer	TA Session	<b>Final problem set distributed</b>	
Oct 26	Mon	<b>Final problem set due by 8pm</b>				
Oct 28	Wed	9 – 10am	Renal	Hanss	Introduction to the Model and Renal Physiology	
Oct 29	Thurs	9 – 11am	Renal	Felsenfeld	Cytoskeleton in Polarized Epithelium	
Nov 2	Mon	9 – 12pm	Renal	He, Chuang, Neves	Disease of Renal Podocytes and Cytoskeleton Disorders Modeling Signaling Pathways, Cytoskeleton and Cell Shape/Journal Club	
Nov 3	Tues	9 – 10am	Renal	He, Chuang	Actin Regulation in Podocyte Disease/Journal Club	
Nov 4	Wed	9 – 11am	Renal	Hanss	Introduction to Channels and Transporters/Journal Club <b>Small problem set distributed</b>	
Nov 6	Fri	See note	Renal	TA Session (note: time to be scheduled with class input)		
Nov 9	Mon	<b>Small problem set due by 8pm</b>				
Nov 10	Tues	9 – 10am	Renal	Satlin, Lipkowitz	Channel Disorders and Barter Syndrome	
Nov 11	Wed	9 – 10am	Renal	Satlin, Lipkowitz	Barter Syndrome/Journal Club	
Nov 13	Fri	10 – 12pm	Renal	Satlin, Lipkowitz	Channel Disorders and Liddle's Syndrome/Journal Club	
Nov 16	Mon	9 – 12pm	Renal	Ma'ayan, He	Implication of Network Analysis in Disease	
Nov 17	Tues	9 – 10am	Renal	Bottinger	Personalized Medicine in Kidney Disease	
Nov 19	Wed	9 – 11am	Renal	Hanss, He	Problem Set Review <b>Final problem set distributed</b>	
Nov 24	Tues	<b>Final problem set due by 8pm</b>				
Nov 30	Mon	9 – 11am	Drug Abuse	Nestler	Clinical Perspective on Drug Addiction Disorders	
Nov 30	Mon	11 – 12pm	Drug Abuse	Jutras-Aswad	Journal Club	
Dec 1	Tues	9 – 11am	Drug Abuse	Devi	Receptors, Transporters and Signaling	
Dec 2	Wed	9 – 11am	Drug Abuse	Russo	Synaptic and Structural Plasticity	
Dec 3	Thurs	9 – 11am	Drug Abuse	Alberini	Learning and Memory in Addiction <b>Small problem set distributed</b>	
Dec 6	Sun	<b>Small problem set due by 8pm</b>				
Dec 7	Mon	9 – 11am	Drug Abuse	Hurd	Neurocircuitry in Addiction	
Dec 7	Mon	11 – 12pm	Drug Abuse	TA Session		
Dec 8	Tues	9 – 11am	Drug Abuse	Ivanov	Neuroimaging of Receptors and Transporters	
Dec 9	Wed	9 – 11am	Drug Abuse	Fossella	Genetic Polymorphisms in Affective Disorders	
Dec 10	Thurs	9 – 11am	Drug Abuse	Ma'ayan	Systems Modeling of Addiction Signaling Networks	
Dec 11	Fri	9 – 11am	Drug Abuse	Ma'ayan	Journal Club <b>Final problem set distributed</b>	
Dec 16	Wed	<b>Final problem set due by 8pm</b>				