

Fall 2011 Course BSR1800 (G301)

SYSTEMS BIOMEDICINE: MOLECULES, CELLS AND NETWORKS

Core Course for the Systems Biology of Disease and Therapeutics (SBDT) Training Area

COURSE MODULES:

INTRODUCTION, DIABETES, CANCER, RENAL, DRUG ABUSE

COURSE DIRECTOR:

Jeanne P. Hirsch, PhD, Associate Professor
Department of Pharmacology and Systems Therapeutics
Mount Sinai School of Medicine

6 CREDIT COURSE

Course Dates:

August 22, 2011 to December 19, 2011

Location:

Annenberg Building, 19th Floor, Room
19-50, Department of Pharmacology
and Systems Therapeutics

COURSE HIGHLIGHTS

- Integrates molecular biology with physiology and systems biology
- Translational Perspective
- Active-learning
- Problem Set Based
- Integrated Journal Club

LECTURE TOPICS

Module 1: Introduction

- Responsible Conduct of Research
- Protein Structure
- Membrane Transport
- Physiological Homeostasis
- Enzyme Kinetics
- Receptor Binding
- Introduction to MatLab
- MatLab Workshop: Simulation of Enzyme Kinetics
- Transcription
- Epigenetics
- Protein Translation
- Analysis of Large Datasets
- Classical Genetics
- Advanced Genetic Techniques

Module 2: Diabetes

- Overview of Diabetes
- Glucose Metabolism
- Glucose/Fatty Acid Metabolism and OXPHOS
- Genetics of Diabetes
- Insulin Secretion
- Drug Discovery
- MatLab Workshop: Modeling Metabolism
- RTK Signaling
- Organ Cross-talk in Pathogenesis of Diabetes
- Drug Strategies

Module 3: Cancer

- Growth Control: Cell Cycle and Apoptosis
- MatLab Workshop: Modeling the Cell Cycle
- Oncogenes and Tumor Suppressors
- Use of Model Organisms in Studying Cancer
- Signaling Pathways in Cancer
- Cancer Genetics
- Metastasis
- Cancer Pathology
- Cancer Biology
- Chemotherapeutics
- Cancer Epidemiology
- MatLab Skill Enhancement
- MatLab Workshop: Chemotherapeutics

Module 4: Renal

- Renal Physiology
- Cytoskeleton in Polarized Epithelium
- Disease of Renal Podocytes, Cytoskeleton Disorders, Cytoskeleton and Cell Shape
- Actin Regulation in Podocyte Disease
- Introduction to Channelopathies
- Channel Disorders: Barter and Liddle's Syndromes
- Modeling Signaling Pathways, Cytoskeleton and Cell Shape
- Implication of Network Analysis in Disease
- Personalized Medicine in Kidney Disease

Module 5: Drug Abuse

- Receptors, Transporters and Signaling
- Synaptic and Structural Plasticity
- Channels and Transporters in Addiction
- Introduction to Animal Models of Addiction
- Modeling in Addiction Signaling
- Neurocircuitry in Addiction
- Neuroadaptive Mechanisms in Addiction
- Neuroimaging of Receptors and Transporters
- Clinical Perspective on Drug Addiction Disorders
- Systems Modeling of Addiction Signaling Networks



The Systems Biology Center New York (SBCNY) is supported by grant number P50 GM071558 from the National Institute of General Medical Sciences.

Integrated Predoctoral Training Program in Pharmacological Sciences is supported by grant number T32 GM062754 from the National Institute of General Medical Sciences.

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