Course BSR1800 (G301)

SYSTEMS BIOMEDICINE
Molecules, Cells and Networks

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

FALL 2012

COURSE MODULES
INTRO | DIABETES | CANCER | RENAL | DRUG ABUSE

6 CREDIT COURSE

Course Dates:
August 27, 2012 to December 14, 2012

Location:
Annenberg Building
19th Floor, Room 19-50

Department of Pharmacology and Systems Therapeutics
Mount Sinai School of Medicine
New York, New York 10029

LECTURE TOPICS

Module 1: Introduction
• Responsible Conduct of Research
• Protein Structure
• Membrane Transport
• Physiological Homeostasis
• Introduction to MatLab
• Enzyme Kinetics
• Receptor Binding
• MatLab Workshop: Simulation of Enzyme Kinetics
• Classical Genetics
• Transcription
• Protein Translation
• Advanced Genetic Techniques
• Epigenetics
• Analysis of Large Datasets

Module 2: Diabetes
• Overview of Metabolism
• Overview of Diabetes
• RTK Signaling
• Glucose Metabolism
• Organ Cross-talk in Pathogenesis of Diabetes
• Fatty Acid Metabolism
• Mitochondrial Energetics and Insulin Secretion
• Genetics of Diabetes
• Drug Strategies
• MatLab Workshop: Modeling Metabolism

Module 3: Cancer
• Growth Control: Cell Cycle and Apoptosis
• MatLab Workshop: Modeling the Cell Cycle
• Oncogenes and Tumor Suppressors
• Cancer Genetics
• Signaling Pathways in Cancer
• Metastasis
• Use of Model Organisms in Studying Cancer
• Cancer Pathology
• MatLab Workshop: Chemotherapeutics
• Chemotherapeutics
• Cancer Epidemiology
• Cancer Biology

Module 4: Renal
• Renal Physiology
• Cytoskeleton in Polarized Epithelium
• Disease of Renal Podocytes, Cytoskeleton Disorders, 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

Module 5: Drug Abuse
• Receptors, Transporters and Signaling
• Neurocircuity in Addiction/Genetics of Addiction
• Channels and Transporters in Addiction
• Synaptic and Structural Plasticity
• Optogenetic and Virogenetic Techniques in Addiction Research
• Introduction to Animal Models of Addiction
• Neuroraming of Receptors and Transporters
• Systems Biology Methods to Study Addiction
• Modeling in Addiction Signaling
• Clinical Perspectives on Drug Addiction Disorders

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