

**FUNDAMENTALS OF BASIC MEDICAL SCIENCES I
IDL 580**

TIME: 8:30 am - 10:30 am - Monday through Thursday;
9:00 am - 11:30 am - Fridays (Problem Solving [PS])

PLACE Medical Sciences Building, Ray Butler Conference Room or LMB (As indicated)

TEXT: Alberts, et al., *Molecular Biology of the Cell*, 4th Edition
Voet and Voet. *Biochemistry*, 3rd Edition

PREREQUISITES: College level Biochemistry

COURSE DIRECTORS: Kai-Ming Chou, Ph.D., Department of Cell Biology and Neuroscience
Jonathon P. Audia, Ph.D., Department of Microbiology and Immunology

COURSE OBJECTIVES: The purpose of this course is to provide the first-year graduate student a rigorous background in the principles of biological chemistry and cellular physiology. The principles taught are those we believe the student should master regardless of the discipline the student chooses as his major area of research and study. IDL 580 is a prerequisite for the Spring semester IDL course.

SECTION I: BASIC BIOCHEMICAL PRINCIPLES (Section Leader: Dr. Winkler)

<u>DATE</u>	<u>TOPIC</u>		<u>INSTRUCTOR</u>
	HR 1	HR 2	
8/20	Evolution and Biological Diversity	Evolution and Biological Diversity	Winkler (LMB)
8/21	Prokaryotic and Eukaryotic Cells	Prokaryotic and Eukaryotic Cells	Winkler (LMB)
8/22	Thermodynamic Principles	Thermodynamic Principles	Winkler (LMB)
8/23	pH and Acid/Base Chemistry	Amino Acid Chemistry	Winkler (LMB)
8/24	PROBLEM SOLVING		Winkler (LMB)

SECTION II: PROTEIN CHEMISTRY (Section Leader: Dr. Funkhouser)

8/27	Primary Structure of Proteins	Secondary Structure of Proteins	Funkhouser
8/28	3D-Structure of Proteins	3-D Structure of Proteins	Funkhouser
8/29	The Globin Protein Family: Protein-Ligand Interactions and Cooperativity	The Immunoglobulin Superfamily: Complementary Interactions between Proteins and Ligands	Funkhouser
8/30	Mass Spectrometry	Mass Spectrometry	Pannell
9/3	LABOR DAY		
9/4	Enzyme Kinetics	Enzyme Kinetics	Lincoln
9/5	Enzyme Inhibition	Enzyme Inhibition	Lincoln
9/6	Enzyme Reaction Mechanisms	Allosteric Mechanisms	Lincoln
9/7	PROBLEM SOLVING		Lincoln

9/10 EXAM 1 (Covers 8/20 – 9/6 Lectures) [22 Lectures]

SECTION III: METABOLISM (Section Leader: Dr. Lane)

9/11	Carbohydrate Chemistry	Fermentation Glycolysis	Lane
9/12	Glycolysis/Pentose Shunt	TCA Cycle	Lane

9/13	Glycogen Metabolism	Introduction to Energetics	Lane
9/17	Mitochondrial Respiratory Function	Oxidative Phosphorylation	Lane
9/18	Amino Acid Metabolism	Gluconeogenesis	Lane
9/19	Metabolic Coordination-Prokaryotic	Metabolic Coordination – Eukaryotic	Lane

SECTION IV: NUCLEIC ACIDS AND MOLECULAR BIOLOGY (Section Leader: Dr. Foster)

Prokaryotic Subsection			
9/20	DNA/Chromosome Structure	Chromosome Replication	Foster
9/24	Transcription	Translation	Foster
9/25	Regulation of Gene Expression	Regulation of Gene Expression	Foster
9/26	Bacterial Cell Signaling	Bacterial Cell Signaling	Audia
9/27	Bacterial Gene Transfer	Bacterial Gene Transfer	Wood
10/1	Phage and Gene Transfer	Recombination	Wood

10/3 EXAM 2 (Covers 9/11 -10/1 Lectures) [24 lectures]

Eukaryotic Subsection			
10/4	Nuclear Pore/Nuclear Transport	Gene Organization	Lincoln/Alexeyev
10/5	PROBLEM SOLVING		Wood
10/8	Chromosome Structure/ Chromatin Remodeling	Replication/Recombination	Chou
10/9	DNA Damage/Mutagenesis	DNA Repair	Chou
10/10	Transcription factors	RNA Polymerases	R.Samant/L.Samant
10/11	mRNA Transcription	RNA Processing and Catalysis	R.Samant/L.Samant
10/15	Transcriptional Regulation	Small/regulatory RNAs	Barik/Jiu
10/16	Translation	Regulation of Translation	Aronson
10/17	Protein Degradation	Regulation of Protein Degradation	Aronson
10/18	OPEN		

10/22 EXAM 3 (Covers 10/4 through 10/18 Lectures) [16 lectures]

SECTION V: MEMBRANES AND ORGANELLES (Section Leader: Dr. Balczon)

10/23	Lipid Chemistry Function	Regulation of Fatty Acid Synthesis	Yang
10/24	Regulation-Fatty Acid Degradation	Cholesterol and Lipid Modification	Yang
10/25	Membrane Structure and Function	Membrane Structure and Function	Rich
10/29	Diffusion and Membrane Transport	Active Membrane Transport	Stevens
10/30	Ion Channel Structure and Function	Ion Channel Structure and Function	Xin/Cioffi
10/31	Intracellular Transport – The ER	Intracellular Transport – The ER	Fields
11/1	The Golgi	The Golgi	Fields
11/5	Vesicular Trafficking	Lysosomes	Fields
11/6	Exocytosis/Endocytosis	Exocytosis/Endocytosis	Fields
11/7	Cell Polarity	Cell Polarity	Balczon

SECTION VI: CELL MOVEMENT AND ADHESION (Section Leader: Dr. Balczon)

11/8	The Cytoskeleton	Biochemistry of Cellular Filaments	Balczon
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11/12 EXAM 4 (Covers 10/23 through 11/7 Lectures) [20 lectures]

11/13	Cell Motility – Eukaryotic	Cell Motility (Eukaryotic)	Lincoln
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11/14	Cell Motility (Prokaryotic)	Chemotaxis (Prokaryotic)	Audia
11/15	Integrins – Structure	Integrins (Signaling)	Gebb
11/19	Cell Matrix/Glycoproteins	Cell Matrix/Metalloproteinases	Balczon
11/20	Cell Matrix Interactions	Cell – Cell interactions	Gebb

11/21-25 THANKSGIVING HOLIDAY

11/26	Cell division – Mitosis	Biochemistry of Cell Division	Balczon
11/27	Cell Cycle Regulators	Cell Division – Meiosis	Balczon

SECTION VII: CELL SIGNALING (Section Leader: Dr. Rich)

11/28	General Principles of Cellular Signaling/Receptors	General Principles of Cellular Signaling/Receptors	Rich
11/29	GPCRs/G Proteins/ Adenyl cyclase/cAMP	Cyclic GMP	Stevens/Rich

11/30 PROBLEM SOLVING **Balczon**

12/3	Protein Kinases and Phosphatases	Protein Kinases and Phosphatases	Rich/Honkanen
12/4	Ca ²⁺ Signaling	Other Signaling Pathways	Taylor/Rich
12/5	Integration of Signaling Pathways	Integration of Signaling Pathways	Rich

12/7* EXAM 5 (Covers 11/8 – 12/5 Lectures) [26 lectures]

***This is a Friday exam**

**July 27, 2007
JPA**