

BCH 6740 – STRUCTURAL BIOCHEMISTRY – Spring 2007

10:40 - 11:30 am, Room R3-265, Academic Research Building (ARB)

Course Coordinator: Daniel L. Purich, Room R3-126 ARB

This three-part course introduces theoretical and practical aspects of structural biology and biophysical chemistry. The course will be of interest to graduate students (and well-prepared undergraduates) with interests in biochemistry, molecular and cell biology, pharmacology, microbiology and cell science, chemistry, physics, plant sciences, and chemical engineering.

PART A: BCH 6746, MACROMOLECULAR STRUCTURE (Section Coordinator: Robert McKenna)

<u>Lecture</u>	<u>Day, Date</u>	<u>Lecturer</u>	<u>Title</u>
L-1	M, 1/08	Purich	Model Building in Biophysics: Virtues, Vices & Victories
L-2	T, 1/09	Dunn	Protein Structure: Peptide Bonds, Secondary Structure & Dihedral Angles
L-3	W, 1/10	Dunn	Protein Structure: Protein Database (PDB) and Visualization Software
L-4	F, 1/12	Dunn	Protein Structure: Anfinsen RNase Experiments & Folding Kinetics
Holiday --- Martin Luther King, Jr. Memorial --- Monday, January 15			
L-5	T, 1/16	Dunn	Protein Structure: Chaperonins & Assisted Folding
L-6	W, 1/17	Dunn	Protein Structure: Fersht Phi-Value Analysis
L-7	F, 1/19	Dunn	Protein Structure: Recent Papers on Protein Folding
L-8	M, 1/22	Dunn	Protein Structure: Recent Papers on Protein Folding
L-9	W, 1/24	Dunn	Protein Structure: Recent Papers on Protein Folding
L-10	F, 1/26	Dunn	Protein Structure: Design & Engineering
L-11	M, 1/29	Long	Supramolecular Structure: The Cytoskeleton
L-12	W, 1/31	Long	Supramolecular Structure: Membrane Proteins
L-13	F, 2/02	Long	Supramolecular Structure: Ribosomes
L-14	M, 2/05	McKenna	Supramolecular Structure: DNA Binding Proteins
L-15	T, 2/06	McKenna	Supramolecular Structure: RNA Binding Proteins
L-16	W, 2/07	McKenna	Supramolecular Structure: Viruses
Review	F, 2/09		Review
Exam	M, 2/12	6-8:00 pm	Covers lectures L-1 through L-16

Note: No recommended textbook for this section. Many topics are based on current literature.

PART B: BCH 6747, BIOPHYSICAL METHODS (Section Coordinator: Thomas Mareci)

<u>Lecture</u>	<u>Day, Date</u>	<u>Lecturer</u>	<u>Title</u>
L-17	W, 2/14	Mareci	Molecular Size: Diffusion & Viscosity
L-18	F, 2/16	Mareci	Molecular Size: Light Scattering & Ultracentrifugation
L-19	M, 2/19	Mareci	Molecular Size: Gel Filtration, Electrophoresis & MALDI-TOF Mass Spec
L-20	W, 2/21	Purich	Absorption Spectroscopy: UV/Visible, Infrared & CD
L-21	F, 2/23	Purich	Absorption Spectroscopy: Beer's Law & Accurate Measurement
L-22	M, 2/26	Bloom	Fluorescence Spectroscopy: Basic Theory
L-23	T, 2/27	Bloom	Fluorescence Spectroscopy: Polarization & Anisotropy
L-24	W, 2/28	Edison	NMR: Chemical Shifts, J-coupling & Nuclear Overhauser Effects (NOE)
L-25	F, 3/02	Edison	NMR: Applications in Macromolecular Structural Biology
L-26	M, 3/05	Edison	NMR: Applications in Small Molecule & Metabolic Studies
L-27	W, 3/07	McKenna	X-Ray Crystallography: General Principles
L-28	F, 3/09	McKenna	X-Ray Crystallography: Bragg Law

SPRING BREAK --- March 10-17, 2006

L-29	M, 3/19	McKenna	X-Ray Crystallography: Phasing & Refinement
L-30	W, 3/21	McKenna	Cryo-EM: Principles and Experimental Design
L-31	F, 3/23	McKenna	Cryo-EM: Structure Analysis
Review	W, 3/28		Review
Exam	M, 4/02	6-8:00pm	Covers lectures L-17 through L-31

Note: Recommended textbook *Biophysical Chemistry* by C. Cantor & P. R. Schimmel (no need to buy; copy on reserve at Health Center Library).

PART C: BCH 7515, KINETICS & THERMODYNAMICS OF MOLECULAR INTERACTIONS

(Section Coordinator: Daniel L. Purich)

<u>Lecture</u>	<u>Day, Date</u>	<u>Lecturer</u>	<u>Title</u>
L-32	T, 4/03	Purich	Chemical Kinetics: Measuring Reaction Rates
L-33	W, 4/04	Purich	Chemical Kinetics: Reaction Order, Molecularity, <i>etc.</i>
L-34	F, 4/06	Purich	Chemical Kinetics: Single- & Multi-step Mechanisms
L-35	M, 4/09	Purich	Chemical Kinetics: Model Testing (Data Analysis & Simulation)
L-36	T, 4/10	Purich	Basic Enzyme Kinetics: Measuring Enzyme Reaction Rates
L-37	W, 4/11	Purich	Basic Enzyme Kinetics: One-Substrate Kinetics
L-38	F, 4/13	Purich	Basic Enzyme Kinetics: Multi-Substrate Kinetics
L-39	M, 4/16	Purich	Basic Enzyme Kinetics: Kinetic Isotope Effects
L-40	T, 4/17	Purich	Basic Enzyme Kinetics: Inhibitor Design
L-41	W, 4/18	Purich	Protein-Ligand Interactions: Measuring Equilibrium Binding
L-42	F, 4/20	Purich	Protein-Ligand Interactions: Allosterism & Cooperativity
L-43	M, 4/23	Purich	Biochemical Kinetics: Pulse-Chase Kinetics
L-44	T, 4/24	Purich	Biochemical Kinetics: Protein Polymerization Kinetics
L-45	W, 4/25	Bloom	Biochemical Kinetics: Protein-Nucleic Acid Interactions
Review	F, 4/27		Review (covering lectures L-32 through L-45)
Exam	M, 4/30	6-8:00 pm	Exam covers Lectures L-32 through L-45)

Recommended Textbook: *Contemporary Enzyme Kinetics & Mechanism* by D. L. Purich, Academic Press, NY.
(no need to buy; copy available at Health Center Library):

Course Instructors:	Bloom, Linda B.	lbloom@ufl.edu
	Dunn, Ben M.	bdunn@ufl.edu
	Edison, Arthur S.	art@mbi.ufl.edu
	Long, Joanna R.	jrlong@mbi.ufl.edu
	Mareci, Thomas H.	thmareci@ufl.edu
	McKenna, Robert	rmckenna@ufl.edu
	Purich, Daniel L.	dipurich@ufl.edu

ADDITIONAL INFORMATION:

This course meets on Mondays, TUESDAYS (when indicated), Wednesdays & Fridays. Students should give due attention to the course schedule.

Some exams are take-home. Others are a combination of assigned homework and in-class exam.

NO COMPREHENSIVE FINAL EXAM !

The overall letter grade for BCH 6740 is based on letter grades earned in each section.