

Foundations of Structural Biochemistry

MCB 5012 - Fall 2015

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Meeting Times: Tuesdays and Thursdays 11 am -12:15 pm in TLS 301

Introduction to Biological Macromolecules (Chapter 1)

Bonding and functional groups
Molecular interactions

Biological Macromolecules

Proteins (Chapter 4)

Amino acid structure and chemistry
Protein folding, motifs and stability

Carbohydrates (Chapter 3)

Monosaccharide structure and chemistry
Polysaccharides and glycoconjugates

Lipids (Chapter 3)

Diversity, chemistry and physical properties
Structural lipids in membranes

Nucleic Acids (Chapter 2)

Double helical structures of DNA and RNA
Structural and functional versatility of RNA

Energy and Intermolecular Forces

Energy and Intermolecular Forces (Chapter 6)

Thermodynamics
Energetics of intermolecular interactions

Free Energy (Chapter 9)

Free energy of biochemical reactions and transport
Coupling mechanisms and work

Chemical Potential and the Drive to Equilibrium (Chapter 10)

Chemical potential
Equilibrium constants and acid-base equilibria

Molecular Interactions

Molecular Recognition (Chapter 12)

The thermodynamics of molecular interactions
Drug Binding by proteins

Specificity (Chapter 13)

Protein-protein interactions
Protein-nucleic acid interactions

Allostery (Chapter 14)

Ultrasensitivity of molecular responses
Hemoglobin

Kinetics and catalysis

The Rates of Molecular Processes (Chapter 15)

General kinetic principles
Reversible reactions, steady states and equilibrium
Factors that affect the rate constant

The Principles of Enzyme Catalysis (Chapter 16)

Michaelis-Menten Kinetics
Enzyme Inhibition
Enzyme Mechanisms

Exam Dates: September 24, October 29, and Final Exam on December 15, 9:30-11:30. Students are required to be available for their final exam during the stated time. If you have a conflict with this time you must visit the Office of Student Services and Advocacy to discuss the possibility of rescheduling this exam.

Homework: There will be four homework assignments

Office Hours: By appointment

Course Textbook

The Molecules of Life: Physical and Chemical Principles, 1st Edition, Kuriyan, J., Konforti, B. & Wemmer, D., Garland Science, New York, 2012.

Other Useful Texts / Background Information

Proteins-Structures and Molecular Properties by Thomas E. Creighton

Biochemistry, 3rd Edition, Voet D. and Voet, J.G., 2005, Wiley, New York.

Biochemistry, 5th Edition, Berg, J. M., Tymoczko, J. L. & Stryer, L., 2002, W. H. Freeman, New York.

Lehninger: Principles of Biochemistry, 4th Edition, Nelson, D. L. and Cox, M. M., 2005, W. H. Freeman, New York.

Structure and Mechanism in Protein Science, Fersht, A., 1999, W.H. Freeman, New York.

Principles of Physical Biochemistry, 2nd Edition, Van Holde, K. E., Curtis Johnson, W. & Ho, P. S., 2006, Prentice Hall, Upper Saddle River, New Jersey.

Protein Structure and Function, Petsko, G. A. and Ringe, D., 2004, New Science Press, London.

Textbook of Structural Biology, Liljas, A. et al., 2009, World Scientific Publishing, Singapore.

Academic Integrity and Community Standards

We will enforce the University of Connecticut policies regarding academic integrity and community standards. In particular, incidents of cheating or plagiarism will not be tolerated and will result in failure of the course. or definitions and policies regarding academic misconduct see:

http://www.community.uconn.edu/academic_integrity.html