

Global Learning Semesters

Course Syllabus

Course: BIOL-320 Basic Concepts of Applied Biochemistry

Department: Health and Life Sciences

Host Institution: University of Nicosia, Nicosia, Cyprus



Course Summary		
Course Code	Course Title	Recommended Credit Hours
BIOL-320	Basic Concepts Of Applied Biochemistry	3
Semester Offered	Contact Hours	Prerequisites
Please contact us	42-45	CHEM-150, CHEM-160, BIOL-270
Department	Level of Course	Language of Instruction
Health and Life Sciences	Upper Division	English

Course Description

This course presents the physical principles responsible for the biochemical properties of biological molecules with regard to their structure and function in the living cell and the methods used to analyze structure and function. Topics covered include: protein architecture and folding; nucleic acid structures and energetics; structure determination by X-ray crystallography and NMR; biological spectroscopy with emphasis on absorption, fluorescence, and NMR spectroscopies and the kinetics and thermodynamics of protein-ligand interactions. The aim of the course is to give students a basic understanding of the physical chemistry laws that govern biochemical properties and mechanisms of action of proteins, lipids and nucleic acids with relevance to solving problems in biology and medicine. The course format will be lectures (3h/week) and assigned reading.

Prerequisites

CHEM-150, CHEM-160, BIOL-270

Topic Areas

1. Biological Macromolecules; intermolecular forces and interactions.
2. Thermodynamic Principles.
3. Molecular Thermodynamics.
4. Enzyme kinetics; equilibrium systems.
5. Methods for the Separation and Characterization of Macromolecules.
6. Solutions and Macromolecules; density, ultracentrifugation.
7. Crystallography and X-Ray Diffraction.
8. Quantum Mechanics; Light Spectroscopy; fluorescence.
9. Absorption Spectroscopy, Linear and Circular Dichroism.
10. Emission Spectroscopy.
11. Nuclear Magnetic Resonance Spectroscopy.
12. Macromolecules in Solution: Thermodynamics and Equilibria.
13. Thermodynamics of Transport Processes.

Readings and Resources

Required Textbook

1. Physical Chemistry: Principles and Applications in Biological Sciences (4th Edition) by Ignacio Tinoco, Kenneth Sauer, James C. Wang, Joseph D. Puglisi Publisher: Prentice Hall; 4 edition (August 6, 2001) ISBN: 013095943X

Recommended Reading

2. Physical Biochemistry: Principles and Applications by David Sheehan Publisher: John Wiley & Sons; 1st edition (August 15, 2000) ISBN: 0471986631
3. Physical Chemistry for the Chemical and Biological Sciences by Raymond Chang Publisher: University Science Books; 3rd edition (February 1, 2000) ISBN: 1891389068
4. Physical Chemistry: A Molecular Approach by Donald A. McQuarrie, John D. Simon Publisher: University Science Books (July 1, 1997) ISBN: 0935702997
5. Principles of Physical Biochemistry by Kensal E van Holde, Curtis Johnson, Pui Shing Ho Publisher: Prentice Hall; Physical biochemistry edition (January 6, 1998) ISBN: 0137204590
6. Lehninger Principles of Biochemistry, Third Edition by David L. Nelson, Michael M. Cox Worth Publishing; ISBN: 1572599316; 3rd Bk&Cd-Rom (Windows) edition (May 2000)
7. Medical Biochemistry by John Phd Baynes (Editor), Marek H. Dominiczak Mosby-Year Book; ISBN: 0723430128; Bk&Cd-Rom edition (September 15, 1999)
8. Guide to Lehninger Principles of Biochemistry by Marcy Osgood, Karen Ocorr Publisher: Worth Publishing; 3rd edition (December 2000) ISBN: 1572591676
9. BIOCHEMISTRY: The Molecular Basis of Life, Third Edition by Trudy McKee, James R. McKee, Publishers: McGraw-Hill, 2002 ISBN: 0-07-231592-X
10. BASIC CONCEPTS IN BIOCHEMISTRY: A Student's Survival Guide, Second Edition by Hiram F. Gilbert, Publishers: McGraw-Hill, 2000 ISBN: 0-07-135657-6
11. Harper's Biochemistry by Robert K., Md Murray, Daryl K. Granner, Peter A. Mayes, Victor W. Rodwell, Appleton & Lange, Robert K. Murray Publisher: McGraw-Hill/Appleton & Lange; 25th edition (August 28, 1999) ISBN: 0838536840
12. The Stuff of Life : Profiles of the Molecules That Make Us Tic by Eric P. Widmaier Publisher: Owl Books; 2nd Rep edition (September 1, 2003) ISBN: 0805074376
13. Principles of Biochemistry With a Human Focus by Reginald H. Garrett, Charles M. Grisham, Garrett Publisher: Brooks Cole; 1st edition (May 14, 2001) ISBN: 0030973694
14. Biochemical Individuality by Roger Williams Publisher: McGraw-Hill; 1 edition (September 11, 1998) ISBN: 0879838930
15. Metabolic Regulation: A Human Perspective by Keith N. Frayn Publisher: Blackwell Publishers; 2nd edition (October 1, 2003) ISBN: 063206384X
16. Proteins : Structures and Molecular Properties by Thomas E. Creighton Publisher: W. H. Freeman; 2nd edition (August 15, 1992) ISBN: 071677030X
17. Mechanics of Motor Proteins and the Cytoskeleton by Jonathon Howard Publisher: Sinauer Associates (February 1, 2001) ISBN: 0878933344
18. Protein Physics: A Course of Lectures by Alexei V. Finkelstein, Oleg Ptitsyn Publisher: Academic Press (May 14, 2002) ISBN: 0122567811

19. Methods in Modern Biophysics by Bengt Nolting Publisher: Springer-Verlag (November 1, 2003) ISBN: 3540012974
20. Physical Chemistry by Keith James Laidler Publisher: Not Avail; 4th Bk&Cdr edition (May 1, 2002) ISBN: 061815292X
21. Recent Research Developments in Biophysical Chemistry by Dr. Carlos A. Condat and Dr. Ana Baruzzi Publisher: Research Signpost (June 1, 2002) ISBN: 8177361163
22. Physical Chemistry for the Biosciences by Raymond Chang Publisher: University Science (March 30, 2005) ISBN: 1891389335