

Global Learning Semesters

Course Syllabus

Course: CHEM-104 Basics of Organic and Biological Chemistry

Department: Biomedical Sciences

Host Institution: University of Nicosia, Nicosia, Cyprus



Course Summary		
Course Code	Course Title	Recommended Credit Hours
CHEM-104	Basics of Organic and Biological Chemistry	3
Semester Offered	Contact Hours	Prerequisites
Please contact us	42-45	CHEM-101, CHEM-102
Department	Level of Course	Language of Instruction
Biomedical Sciences	Lower Division	English

Course Description

The purpose of this course is to give students an understanding of the basic concepts and principles of organic molecules and chemistry especially as they apply to biological molecules and systems and to introduce to the students the biochemical principles of cell and body functions. The student will also learn about the biochemical compounds and test relevant to human body biochemistry in health and disease. The course format is 3 h lectures and 1 h laboratory tutorial session per week

Prerequisites

CHEM-101, CHEM-102

Topic Areas

1. Key organic molecules and biochemical reactions
2. Physical-chemical interactions in biological macromolecules
3. Proteins, glycoproteins and nucleic acids; biochemical properties
4. Methods for separation and detection of biological macromolecules (centrifugation, chromatography, electrophoresis, spectroscopy).
5. The biochemistry of the Acid/Base homeostasis in the human body
6. The chemistry of biosynthetic pathways and the regulation of key enzymes
7. The Generation of Biochemical Energy; the biochemical basis of human nutrition (hormone regulated caloric homeostasis)
8. Chemical Messengers: Hormones, Neurotransmitters, and Drugs
9. The biochemistry of complex lipids
10. Liver, amino acid metabolism and special functions
11. Liver and kidney, the biochemistry of nitrogen metabolism
12. The biochemistry of blood coagulation/fibrinolysis
13. Bone and cardiac muscle biochemistry
14. Cell biochemistry-mutation types and mechanisms
15. Nuclear Chemistry

Lab/Tutorial Exercises

During the session the student will become familiar with the basic biochemistry of clinical chemistry tests and measurements of biochemical compounds and their relation to pathophysiological conditions. The student will be

able to understand the applications of organic chemistry and biochemistry principles in differentiating between normal and abnormal test measurements through exercises with simulated results of case studies.

1. List of Biochemical Tests by Body System
2. Biotechnological and Technological instrumentation in clinical chemistry test.
3. Blood Test: hematocrit measurements; blood glucose, lipoproteins, lipids
4. Blood Test: hormones
5. Blood Test and Fluid Analysis: urine, proteins and electrolytes
6. Blood Test: organ function enzymes
7. Stool Tests
8. Cell and nucleic acid stains
9. Smear Tests
10. Pregnancy Tests
11. Seminal fluid Tests
12. Gastric analysis Tests
13. Immunoheamatology Tests
14. Chromosome stains and fluorescence probes
15. DNA based forensics tests

Readings and Resources

Required Textbooks

1. Fundamentals of General, Organic, and Biological Chemistry by John McMurry, Mary E. Castellion, Mary E Castellion Publisher: Prentice Hall; 4th edition (June 27, 2002) ISBN: 013041842
2. Mosby's Manual of Diagnostic and Laboratory Tests by Kathleen Deska Pagana, Timothy James Pagana Publisher: Mosby; 2nd edition (January 15, 2002) ISBN: 032301609X

Recommended Textbooks

1. Chemistry: An Introduction to General, Organic and Biological Chemistry MEDIA UPDATE PACKAGE (7th Edition) by Karen Timberlake Publisher: Benjamin/Cummings; Book and CD-ROM edition (December 22, 2000) ISBN: 0805335684
2. Chemistry and Life: An Introduction to General, Organic and Biological Chemistry (6th Edition) by John William Hill, Stuart J. Baum, Rhonda J. Scott-Ennis Publisher: Prentice Hall College Div; 6th edition (December 7, 1999) ISBN: 0130821810
3. Laboratory Mathematics: Medical and Biological Applications by Joe Bill Campbell, June Mundy Campbell Publisher: C.V. Mosby; 5th edition (January 15, 1997) ISBN: 0815113978
4. Basic Medical Biochemistry: A Clinical Approach (Books) by Dawn B., PH.D. Marks, Allan D. Marks, Colleen M. Smith Publisher: Lippincott Williams & Wilkins (August 1, 1996) ISBN: 068305595X
5. Clinical Chemistry: Theory, Analysis, Correlation by Lawrence A. Kaplan, Amadeo Pesce, Steven Kazmierczak Publisher: C.V. Mosby; 4th Bk&Cdr edition (March 1, 2003) ISBN: 0323017169
6. Tietz Fundamentals of Clinical Chemistry by Carl A. Burtis, Edward R. Ashwood Publisher: W.B. Saunders Company; 5th edition (January 15, 2001) ISBN: 0721686346
7. Clinical Chemistry: Principles, Procedures, Correlations by Michael L. Bishop, Janet L. Duben-Engelkirk, Edward P. Fody Publisher: Lippincott Williams & Wilkins; 4th edition (January 15, 2000) ISBN: 0781717760
8. Human Molecular Biology : An Introduction to the Molecular Basis of Health and Disease by Richard J. Epstein Publisher: Cambridge University Press; 1st edition (October 24, 2002) ISBN: 052164481X
9. Clinical Biochemistry: An Illustrated Colour Text by Allan Gaw, Robert A. Cowan, Denis St. J. O'Reilly, Michael J. Stewart, James Shepherd, Rogert Britton Publisher: Churchill Livingstone; 2nd edition (August 15, 1999) ISBN: 0443061831
10. Clinical Biochemistry Made Ridiculously Simple (MedMaster Series, 2004 Edition) by Stephen Goldberg Publisher: Medmaster; 2001 edition (2004) ISBN: 0940780305
11. Acid-Base, Fluids, and Electrolytes Made Ridiculously Simple (MedMaster Series) by Richard A. Preston Publisher: Medmaster (2002) ISBN: 0940780313
12. MP: Human Biology with bound in OLC card by Sylvia S. Mader, Sylvia Mader Publisher: McGraw-Hill Science/Engineering/Math; 8 edition (June 13, 2003) ISBN: 0072921870

13. General, Organic, and Biological Chemistry (With CD-ROM) by Karen C. Timberlake, Karen Timberlake
Publisher: Benjamin Cummings; Bk&CD-Rom edition (January 15, 2002) ISBN: 0321042832
14. Forensic DNA Typing: Biology and Technology Behind STR Markers
by John M. Butler Publisher: Academic Press; 1st edition (February 15, 2001) ISBN: 012147951X
15. An Introduction to Forensic DNA Analysis, Second Edition by Norah Rudin, Keith Inman Publisher: CRC
Press; 2nd edition (December 21, 2001) ISBN: 0849302331