

MISSISSIPPI VALLEY STATE UNIVERSITY
Department of Natural Science – Chemistry Program
Course Number: CH 320
Course Name: Introduction to Biochemistry

Instructor: Matthewos Eshete, PhD
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Textbook: Garrett and Grisham, Biochemistry 5th edition.
Reference text: Biochemistry, 8th edition Mary K. Campbell Shawn O. Farrell,
Lehninger Principles of Biochemistry by Albert L. Lehninger, David L. Nelson, Michael
M. Cox 4th edition and additional Reading will be assigned throughout the semester.

Lectures time / Location: MWF 1:00 pm -1:50 pm / FLW Building, Room 228
Lab time / Location: T 1:00 pm -3:40 pm / FLW Building, Room 235
Office Hours: MWF: 9:00 am - 10:00 am, 11:00 am -12:00 am, R: 9:15 pm - 11:00 pm,
MW: 2:50 pm – 4:00 pm and any other time by appointment

Catalog Course Description: Introduce students to the fundamental concepts and basic principles of biochemistry. It covers Properties of Living Systems, Properties of water molecule, Acids, Bases and PH, Buffers solutions, Basic concepts of Thermodynamics, Structures and Properties of the Amino Acids Fundamental structural patterns in protein and Structure and chemistry of fatty acids (4 credit hours)

PURPOSE:

Employing Mississippi Valley State University's Holistic Transformer Model (HTM) CH 320, Contributes to the education and training of Holistic Transformer; that is, those who may be considered to be scholars who continually strive to understand the workings of nature, life long learners who build upon accreting knowledge and understanding, reflective thinkers who ruminate on the marvels and intricacies of nature at large, and facilitators who stimulate the natural curiosity of others – particularly public school students. In doing so, CH 320 develops the skills and scientific background required of teachers of students in the public schools by building upon prior knowledge and skills developed in preceding coursework presented by the Department of Sciences and Environmental Health, and by the college of Education.

GENERAL COURSE GOALS

The following general course goals are established to meet the purposes of CH 320:

1. Develop fundamental understanding of the material classifications and properties.
2. Provide model exercises and demonstrations that enhance the understanding of natural principles and illustrate safe laboratory techniques and practices.
3. Raise awareness of the underlying logic of the presentations and the use of inductive and deductive reasoning.
4. Develop factual report writing skills.
5. Increase scientific vocabulary and facility with common pronunciation related to the use of that vocabulary.
6. Cultivate thoughtful, probing inquiry and discussion.
7. Clarify the significance of replicated, standards or controls, measurements, data reduction and presentation analysis, and accuracy in reporting of the scientific activities.

COURSE CONTENT AND TENTATIVE TIME LINE:

Week 1

Course overview, Lab Safety seminar

Week 2: Chapter 1 Properties of Living Systems, Structural Organization of complex Bio-molecules, Organization and structure of Cells and Viruses.

Quiz 1

Week 3: Chapter 2 Properties of water molecule, Acids, Bases and PH, Buffers solutions and their Importance

Quiz 2

Week 4: Unit exam 1 on Chapters 1 and 2

Week 5: Chapters 3 Basic concepts of Thermodynamics, Thermodynamic parameters and biological events Effect of PH on standard- State free energies, Effect of concentration on net free energy change, The importance of coupled reaction process, Characteristics of high-energy bio-molecules, ATP Hydrolysis and daily human requirement for ATP.

Quiz 3

Week 6: Chapter 4 Structures and Properties of the Amino Acids, Acid–Base Properties of Amino acids, Reactions Amino acids undergo, Optical and stereo-chemical properties of Amino acid

Quiz 4

Week 7: Midterm Week (Midterm exam on Chapters 1-4)

Week 8 and 9: Chapter 5 Fundamental structural patterns in protein, Protein architecture, Protein purification, Amino acid composition, Protein sequencing, Conjugated proteins, Biological function of proteins, Protein Purification and Characterization Techniques

Quiz 5

Week 9 and 10: Chapter 6 Non covalent interaction stabilize protein structure, Protein Secondary Structure, Protein folding and three dimensional protein structure, Quaternary structure of protein

Quiz 6

Week 11: Unit exam 2 on Chapters 5 and 6

Week 11 and 12: Chapter 8 Structure and chemistry of fatty acids, triacylglycerols, Glycerophospholipids, Waxes, Sphingolipids, Terpenes and Steroids.

Quiz 7

Week 13: Chapter 9 Chemical and physical properties of membranes, Structure and chemistry of membrane proteins, and Transport across biological membrane.

Quiz 8

Week 14: Thanksgiving Holiday

Week 15: Chapter 10 Characteristic Feature of Enzymes, Rate of Enzyme – Catalyzed Reaction as defined in mathematical equation, Kinetics of Enzyme- Catalyzed reactions, Enzymes Specificity

Week 16: Final Exam (Chapters 1-6, 8, 9, 10)

EXAMS, QUIZZES AND GRADING:

- Students are responsible for, and may be tested on all the material discussed during lectures and discussion sections as well as assigned reading material whether it was covered in lecture or not.
- Students are expected to take exams during the scheduled times. Dates will be announced in advance. A make-up exam or quiz will be given **ONLY** if a student is **GRAVELY** ill, can provide evidence from a certified M.D., **AND** has notified **BEFORE THE TEST**. Electronic mail and voice mail messages do **NOT** constitute official means of notification. Other emergencies will be considered on a case by case basis.

The final grade will be determined as follows:

Unit Exam	20 %
Midterm exam	20 %
Final Exam	30%
Quiz	30 %
Attendance & class participation	10 %
Total	110%

A= 90- 100%. B= 89- 80%. C=79-70%. D = 69-60%. F= 59-0%

Laboratory Reports:

Reports must be handed in for evaluation and grading one week after each laboratory period. *Deadlines will not be extended.* A complete laboratory report will include:

1. Title
2. Introduction
3. Materials
4. Methods
5. Results
6. Discussion
7. Pre and post lab questions
8. Literature cited if there is any.

STUDENT LEARNING OUTCOMES:

Upon successful completion of CH 320 students will be able to know and understand:

1. Properties of Living Systems, Structural Organization of complex Bio-molecules, Organization and structure of Cells and Viruses.
2. Basic concepts of Thermodynamics, Thermodynamic parameters and biological events Properties of water molecule, Acids, Bases, Buffers solutions and their Importance, PH and Effect of PH on standard- State free energies, Effect of concentration on net free energy change, The importance of coupled reaction process, Characteristics of high-energy bio-molecules, ATP Hydrolysis and daily human requirement for ATP.

3. Structures and Properties of the Amino Acids, Acid–Base Properties of Amino acids, Reactions Amino acids undergo, Optical and stereo-chemical properties of Amino acid
4. Fundamental structural patterns in protein, Protein folding and Protein architecture, Protein Purification and Characterization Techniques, Amino acid composition, Protein sequencing, Biological function of proteins, Protein Non covalent interaction and its role in stabilizing protein structure.
5. Structure and chemistry of fatty acids, Chemical and physical properties of membranes, Structure and chemistry of membrane proteins, and Transport across biological membrane.
6. Characteristic Feature of Enzymes, Rate of Enzyme – Catalyzed Reaction as defined in mathematical equation, Kinetics of Enzyme- Catalyzed reactions, Enzymes Specificity
7. How to model and demonstrate the scientific method as a process in hypothesis development and testing.
8. Accepted facts versus observations, hypotheses, theories, and principles relative to the natural universe.
9. How to demonstrate and model the use of standards for controls, measurements, data reduction and presentation, analysis, and accuracy in reporting of the scientific activities.
10. Use of technology to the study of the biochemistry.

Attendance: Attendance to lecture and laboratory periods are mandatory.

Intellectual Honesty: Students are expected to follow principles of intellectual honesty. A student caught cheating on an exam or quiz will receive zero points for that exam or quiz and will be referred to the Dean of Students' office for appropriate action.

STUDENTS WITH SPECIAL NEEDS

Mississippi Valley State University is committed to providing reasonable accommodations for students with a documented disability. If you feel you are eligible to receive accommodations for a covered disability (medical, physical, psychiatric, learning, vision, hearing, etc.) and would like to request it for this course, you must be registered with the Services for Students with Disabilities (SSD) program administered by University College. It is recommended that you visit the Disabilities Office located inside the EMAP Computer Lab in the Technical Education (IT) Building to register for the program at the beginning of each semester.

For more information or to schedule an appointment, please contact Mr. Billy Benson, Jr. via phone or email at 662-254-3005 or billy.benson@mvsu.edu.

This syllabus does not constitute a contract with the university. It contains the guideline. The instructor reserves the right to make changes in the syllabus as needed.