

**Course Description****MLS4621 | Clinical Biochemistry | 4.00 credits**

This course provides the student with the knowledge and understanding of clinical disorders and how biochemical factors and laboratory methods are used for the investigation, diagnosis and management of patients.

**Course Competencies:**

**Competency 1:** The student will demonstrate knowledge of the principles involved in safety and procedures used in the laboratory procedures by:

1. Applying laboratory safety as described in the OSHA Act of 1970 and all subsequent regulations including instructions in universal precautions
2. Identifying potential laboratory safety hazard situations and take appropriate actions to minimize injury to self and others
3. Pointing out instrument maintenance and calibrations as required to ensure optimal instrument performance during use
4. Illustrating quality control data, equipment maintenance, corrective actions when troubleshooting defective equipment, and test results

**Competency 2:** The student will demonstrate an understanding of Biomolecules and Biochemical methods and its applications by:

1. Explaining the composition of the body and the major class of molecules
2. Illustrating the components of the cell and how they may be isolated and how these components function
3. Evaluating the experimental approach and methods used in Biochemistry
4. Summarizing the principal achievements and technological advances in clinical laboratories
5. Evaluating major contributions to research in the areas of development, differentiation, brain functions, cancer and other human diseases

**Competency 3:** The student will demonstrate knowledge of structures and functions of proteins and enzymes by:

1. Summarizing the 3D structure of amino acids and the kinds of amino acids present and the order they are linked together in a polypeptide chain and the spatial relationship of one amino acid to another
2. Explaining the preparatory techniques used in the clinical industry for separation of amino acids and enzymes like paper Chromatography, High-Performance Liquid Chromatography (HPLC) and Thin Layer Chromatography (TLC)
3. Explaining the cardinal importance of hemoglobin and myoglobin and how their structures dictate their biological functions and their biomedical importance
4. Analyze the structure and function of mitochondrial transport systems and their significance to the laboratory results obtained
5. Explaining the mechanisms of enzymes based on their functions and nomenclature

**Competency 4:** The student will demonstrate knowledge of structure, function and replication of informational macro-molecules by:

1. Correlating how the nucleotides participate in a wide variety of biochemical processes and also serve as a ubiquitous high energy source
2. Evaluating the metabolisms of the purines and the pyrimidines and their nucleosides and their role in understanding human disease evolutions
3. Analyzing the implications of nitrogen removal from amino acids and its impact on the human physiology when defects arise in the biochemical reactions
4. Evaluating the impact of conversions of the carbon skeletons of common amino acids and its impact on inborn errors of metabolism associated with these catabolic pathways
5. Explaining the conversions of amino acids to specialized proteins that are physiologically important products derived from amino acids

**Competency 5:** The student will demonstrate research and development competency by application of

Recombinant DNA technology and advanced techniques by:

1. Correlating laboratory and uses of Recombinant DNA technology and evaluating its significance in the clinical tests
2. Evaluating the basic concepts of recombinant DNA technology and its ever-increasing impact on clinical medicine
3. Examining the human genetic disease from pedigree analysis and the study of defected proteins and the involvement of specific genetic defect leading to clinical analysis in the laboratory
4. Applying medical knowledge to patient's case studies by demonstrating an investigatory and analytical thinking to clinical situations
5. Analyzing the techniques involved and the various methods and their principles involved to arrive at a very rational approach to understanding the molecular basis of a number of diseases

**Learning Outcomes:**

- Communicate effectively using listening, speaking, reading, and writing skills
- Solve problems using critical and creative thinking and scientific reasoning