



Course Description

MLS4630 | Clinical Chemistry | 3.00 credits

The study of the concepts and principles of Clinical Chemistry. Analytes and lab values are correlated to normal homeostasis and disease states.

Course Competencies:

Competency 1: The student will evaluate clinical chemistry principles by:

1. Explaining safety awareness for clinical laboratory personnel
2. Illustrating the responsibilities of employer and employee in providing a safe workplace
3. Detecting hazards related to handling chemicals, biologic specimens
4. Selecting appropriate personal protective equipment when working in the clinical laboratory
5. Selecting the correct means for disposal of waste generated in the clinical laboratory
6. Illustrating the steps required in documentation of an accident in the workplace
7. Detecting and explaining the types of samples used in clinical chemistry
8. Illustrating the general steps for processing blood samples

Competency 2: The student will evaluate analytical techniques and instrumentation by:

1. Explaining and discussing the general principles of analytic method and their limitations
2. Comparing and contrasting the various analytic techniques
3. Discussing existing clinical applications for each analytic technique
4. Describing the operation and component parts of various chemistry analyzers
5. Defining point-of-care testing (POCT)
6. Explaining what basic structure is required to manage a POCT program
7. Explaining process of implementing a POC test
8. Stating the basic principles behind common POC applications

Competency 3: The student will demonstrate knowledge of the principles of laboratory medicine by:

1. Detecting the pre-analytic variables that can adversely affect laboratory results
2. Explaining why statistics are needed for effective quality management
3. Explaining the processes involved in method selection and evaluation
4. Explaining proficiency testing programs in the clinical laboratory
5. Communicating how a process can be systematically improved
6. Classifying the following terms: quality control, accuracy, precision, descriptive statistics, reference interval, random error, sensitivity, specificity, systematic error, and confidence intervals
7. Calculating the following: sensitivity, specificity, efficiency, predictive value, mean, median, range, variance, and standard deviation
8. Evaluating laboratory data using multi rules for quality control
9. Categorizing the types, uses, and requirements for reference intervals
10. Explaining the basic protocols used to verify or establish a reference interval

Competency 4: The student will demonstrate knowledge of different laboratory analytes by:

1. Explaining the function, testing methodologies and clinical significance of the following:
 - a. Amino Acids
 - b. Peptides
 - c. Proteins
 - d. Enzymes
 - e. Cytokines
 - f. Tumor Markers
 - g. Kidney Function Tests
 - h. Carbohydrates
 - i. Lipids, Lipoproteins and Apolipoproteins

- j. Electrolytes and Blood Gasses
- k. Hormones
- l. Catecholamines and Serotonin
- m. Vitamins and Trace Elements
- n. Porphyrins
- o. Therapeutic Drugs
- p. Clinical Toxicology
- q. Toxic Metals

Competency 5: The student will demonstrate an understanding of Pathophysiology by:

2. Explaining the functions, ailments and laboratory tests used to diagnose disorders of the following:
 - a. Cardiac Function
 - b. Kidney Disease
 - c. Water, Electrolyte and Acid Base Metabolism
 - d. Liver Disease
 - e. Pancreatic and Intestinal Function
 - f. Endocrine System
 - g. Reproductive System
 - h. Amino Acid, Organic Acid and Fatty Acid Metabolism

Learning Outcomes:

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