MLT 124L - Clinical Chemistry II Lab

Approval Date:  Effective Term:

Department: MEDICAL LABORATORY TECHNICIAN
Division: Allied Health/Public Safety
Units: 1.00
Grading Option: Letter Grade
Transferability: CSU Transferable
Course is: AA/AS Degree
Repeatability:
Contact Hours per Term:
Lab: 4.00
Associate Degree GE Applicability: No
Recommended Class Size: 15
-Rationale: Station limitations.

Discipline/Minimum Qualifications:

Catalog Description:
Presents more advanced instrumentation used in the clinical chemistry laboratory to test different body systems as well as drug screening, tumor markers, and body fluids. Includes their principles, testing parameters, calibration, quality control, and preventive maintenance.

Schedule Description:
Presents more advanced instrumentation used in the clinical chemistry laboratory to test different body systems as well as drug screening, tumor markers, and body fluids. Includes their principles, testing parameters, calibration, quality control, and preventive maintenance.

Student Learning Outcome:
1. Compare and contrast different types of chemistry laboratory instrumentation, including methodology, sampling, and maintenance used to test body systems, drug screening, tumor markers, and body fluids.
2. Perform basic testing procedures used in the clinical chemistry laboratory to test the functioning of different body systems, as well as drug screening, tumor markers, and body fluids.

Course Objectives:
1. Apply Standard Precautions as they apply in the Chemistry laboratory according to Occupational Safety and Health Administration (OSHA) mandates.
2. Demonstrate safe use and disposal of biohazardous materials.
3. Demonstrate proper pipetting techniques.
4. Describe the operating principles of the automated instrumentation available in the student laboratory.
5. Explain the proteins assayed for in the clinical lab, their common methods of analysis and clinical significance.
7. Describe, based on experience in the student laboratory or during a field trip to one of the clinical affiliate sites, operation of a large chemistry analyzer.
8. Demonstrate the operation of automated instrumentation in the lab.

**Course Content Outline:**

A. Standard Precautions as they apply in the chemistry laboratory according to Occupational health and Safety Administration (OSHA) mandates.
   1. Basic aspects of infection control policies, including how and when to use personal protective equipment (PPA) or devices (glove, gown, and goggles)
   2. Use of PPE during all laboratory work with hazardous material.
   3. The Safety Program as defined in the safety manual.
   4. Pre and post exposure prophylactic measures for handling potential occupational transmission of certain pathogens.
   5. Disinfectants to decontaminate the work area when a hazardous spill has occurred or when beginning or ending a laboratory session.
   6. Basic steps to first-aid.
   7. Safety issues in the laboratory:
      a. Evacuation routes
      b. Biohazardous material
      c. Blood borne pathogens
      d. Standard Precautions
      e. Aerosols
      f. MSDS (Material Safety Data Sheets)
   B. Safe use and disposal of biohazardous materials.
      1. Segregation and disposal of waste products generated in the clinical laboratory, including the use of sharp containers for needles, lancets and/or other sharps.
      2. Proper disposal of biological samples.
   C. Pipetting techniques, dilution preparation and instrument methodologies.
      1. Serial dilution, 2 fold - 10 tubes long.
      2. 1:3 dilution
      3. Operating principles of the instrumentation assigned and the method of each procedure.
   D. Operating principles of the automated instrumentation available.
      1. Normal value or therapeutic ranges for assays.
      2. Charts for recording maintenance and quality control.
      3. Replacement of components of laboratory instrumentation.
         a. Steps for troubleshooting an instrument.
         b. Documentation after component replacement.
         c. Steps to follow when repair or replacement is unsuccessful.
   E. Proteins assayed in the clinical lab, their common methods of analysis and clinical significance.
      1. Electrophoresis and clinical application of immunoglobulin results.
      2. Difference in electrophoretic mobility and function relative to electrophoresis methods.
      3. Specimen consideration, interference and reference range for the electrophoretic techniques.
4. Diseases that cause hypoproteinemia and hyperproteinemia.

F. Methods of determination of hemoglobin A1c.
   1. Clinical significance of HbA1c values with the disease of diabetes.
   2. Types of diabetes and the quantitative insulin levels of each.
   3. End stage complication of "uncontrolled" diabetes.
   4. Correlation of glucose levels, GTT and glycohemoglobin with diabetes mellitus and hypoglycemia.

G. Operation of a large chemistry analyzer.
   1. Maintenance procedures outlined in the operators' manual.
   2. Calibration and quality control procedures associated with the test method for the instrument.
   3. Operating sequence of the analyzer and its major parts.
   4. Trouble shooting with the instrument.
   5. Documentation of the maintenance or troubleshooting on this instrument.
   6. Methodology of tests run on this analyzer.

Methods of Instruction:
Lab:

Methods of Evaluation:
Exams/Tests/Quizzes
Skill Demonstrations

Laboratory write-ups

Typical Assignments:
Reading:
Textbook assignments Supplemental reference books Hand outs (Lab procedures)

Writing, Problem Solving or Performance:
Problem solving for case studies Short essay answers for some exam questions Some calculations

Other:

Required Materials Examples:

Book 1
Author: Bishop, Michael L., Edward P. Fody, & Larry E. Schoeff
Title: Clinical Chemistry: Principals, Procedures, Correlations
Publication Date: 2004
Publisher: Lippincott, Williams & Wilkins
Edition: 5th

Book 2
Author: Burtis, Carl A. & Edward R. Ashwood
Title: Tietz Fundamentals of Clinical
Publication Date: 2007
Publisher: Saunders
Edition: 5th
Chemistry

**Course Preparation:**
Prerequisite(s): MLT 120
MLT 120L

Co-Requisite(s): MLT 124

Recommended: None

**Document Content Review**

**Target Course Skills**

**Condition on Enrollment**
Established

**Faculty**
Donna Berardo Sue Albert

**Basic Content Review**
In MLT 120, Clinical Chemistry I Lecture students learn to use basic supplies and equipment correctly. They learn quality control and quality assurance as it applies to the chemistry department. They learn the basic laboratory methods including the mechanism of measurement and analytical limitations associated with the methods. They learn the basic electrolyte measurement methodologies used in the clinical laboratory and the clinical significance of laboratory results. They learn about acid-base balance and trace elements. In MLT 124L they use this knowledge as they learn about proteins to be assayed and methods to do them. They are now learning about carbohydrates and their methods of analysis. They are learning about heme-derivatives. They learn about toxicology, drug monitoring, pharmakinetics and tumor markers. These all are built on the basic knowledge of electrolytes, acid-base balance and trace elements.

**Condition on Enrollment**
Established

**Faculty**
Sue Albert Donna Berardo

**Basic Content Review**
In MLT 120L, Clinical Chemistry I Laboratory students learn to use basic supplies and instruments correctly. They learn quality control and quality assurance as it applies to the chemistry department. They learn the basic laboratory methods including the mechanism of measurement and analytical limitations associated with the methods. They learn how a laboratory arrives at normal ranges and control ranges when instrumentation differs. They learn the principle of spectrophotometry. In MLT 124L they use this knowledge as they learn about proteins to be assayed and methods to do them. They are now learning about carbohydrates and their methods of analysis. They are learning about heme-derivatives. They learn more about automated instrumentation and are introduce to the large chemistry analyzer.

**Condition on Enrollment**
Established

Faculty
Sue Albert Donna Berardo

Basic Content Review
In MLT 124, Clinical Chemistry II Lecture, the student learns about carbohydrates, heme-derivatives commonly assayed in the clinical laboratory and their clinical significance. They learn about tests and methods for endocrine, therapeutic drug monitoring, toxicology terminology and pharmokinetics. In MLT 124L, Clinical Chemistry II Laboratory II, the students learn to use the instrumentation to test for these substances. They learn the operating principles of the instrumentation used.