MLT 120 - Clinical Chemistry I Lecture

Approval Date:  Effective Term:

Department:  MEDICAL LABORATORY TECHNICIAN
Division:  Allied Health/Public Safety
Units:  3.00
Grading Option:  Letter Grade
Transferability:  CSU Transferable
Course is:  AA/AS Degree
Repeatability:  
Contact Hours per Term:
  Lecture/Discussion:  4.00
Associate Degree GE Applicability:  No
Recommended Class Size:  15
  -Rationale:  Station limitations.

Discipline/Minimum Qualifications:

Catalog Description:
Presents the theoretical and practical concepts associated with testing procedures used in the clinical chemistry laboratory, including the fundamentals of general laboratory principles and specific basic instrumentation and methodologies.

Schedule Description:
Presents the theoretical and practical concepts associated with testing procedures used in the clinical chemistry laboratory, including the fundamentals of general laboratory principles and specific basic instrumentation and methodologies

Student Learning Outcome:
1. Compare and contrast the basic laboratory methods, including the mechanism of measurement and the analytical limitations associated with the method.

Course Objectives:
1. Describe and explain fundamental concepts critical to any analytical procedure.
2. Demonstrate the ability to use basic supplies and equipment correctly.
3. Summarize the use of Standard Precautions as they apply in the Clinical Chemistry laboratory according to Occupational Safety and Health Administration (OSHA) mandates.
4. Summarize quality control and quality assurance as it applies to the Chemistry department of the Clinical Laboratory.
5. Summarize different basic laboratory methods including the mechanism of measurement and analytical limitations associated with the method.
6. Evaluate basic characteristics of enzyme kinetics and enzyme methods of measurement.
7. Compare and contrast electrolyte measurement methodologies used in the Clinical Laboratory and the clinical significance of laboratory results.
8. Examine acid-base balance and the regulatory mechanisms within the body to include the analyte, physiology involved, and clinical significance.
9. Examine trace elements and the regulatory mechanisms within the body to include the analyte, physiology involved, and clinical significance.

Course Content Outline:

A. Fundamental concepts critical to any analytical procedure.
   1. Solving mathematical conversion problems presented using basic laboratory math skills.
   2. Solving mathematical related problems presented using basic laboratory math skills.
B. Use of basic supplies and equipment in the Chemistry lab.
   1. Categorization of different pipettes and pipettors used.
   2. Categorization of the various types glassware used.
   3. Operation of and use of laboratory balances.
   4. Parts and use of microscope and its proper care
   5. Separation techniques used in the Clinical Chemistry Laboratory
   6. Components of the filter photometer, the absorbance spectrophotometer and the reflectance spectrophotometer.
   7. Components of flame emission photometry.
   8. Samples used in clinical chemistry, general steps for processing such samples, the proper drawing order for such tubes and the stopper color acceptable for specimen collection
   9. Pre-analytical, analytical, and post-analytical variables that can adversely affect the results.
C. Summarize the use of Standard Precautions as they apply in the Clinical Chemistry laboratory according to Occupational Safety and Health Administration (OSHA) mandates.
   1. Personal Protective Equipment (PPE) or devices.
   2. Basic aspects of infection control.
D. Quality control and quality assurance in the Chemistry lab
   1. Quality control material used in the chemical laboratory and standards
   2. Primary, secondary, and reference standards.
   3. Choosing control material.
E. Basic laboratory methods including mechanism of measurement and analytical limitations associated with the method.
   1. Colorimetry
   2. Enzyme-linked immunoassays
   3. Electrophoresis
   4. Ion specific electrodes
   5. Fluorescence
   6. Immunodiffusion
   7. Polymerase Chain Reaction
   8. Automated techniques
      a. The development of automated analyzers in the clinical laboratory
      b. Basic approaches to sample analysis used by automated analyzers.
F. Basic characteristics of enzyme kinetics and enzyme methods of measurement.
   1. The chemical composition, properties, and biological functions of enzymes.
   2. Interactions of enzymes, substrate, and product.
   3. Differentiation of first order from zero order kinetics.
   4. Calculating the velocity of reaction using the Michaelis-Menton equation, define parameters of the
1. Acid buffering of acid—base related reactions.
2. Clinical significance of the anayte, physiology involved and clinical significance.
5. Acid base regulation by the lungs and kidneys.
6. The dissociation curve of oxygen from hemoglobin in RBCs and parameters that affect it.
10. Acid base disorders and their clinical causes.

I. Trace elements and the regulatory mechanisms within the body to include the analyte, physiology involved and clinical signif

Methods of Instruction:
Lecture:

Methods of Evaluation:
Exams/Tests/Quizzes
Case Studies

Typical Assignments:
Reading:
Textbook chapter assignments Supplemental reference books
Writing, Problem Solving or Performance:
Problem solving for chapter study questions Short essay answers for some exam questions Some calculations
Other:
Case studies

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

Book 2
Author: Burtis, Carl A. & Edward R. Ashwood
Publication Date: 2007 Edition: 5th

http://www.curricunet.com/Canyons/reports/course_outline_html.cfm?courses_id=1742
Title: Tietz Fundamentals of Clinical Chemistry  
Publisher: Saunders

Book 3  
Author: McPherson, Richard A. and Matthew R. Pincus  
Title: Henry's Clinical Diagnosis and Management by Lab Methods  
Publisher: Saunders

Course Preparation:  
Prerequisite(s): None  
Co-Requisite(s): MLT 120L  
Recommended: None