

## **SEWARD COUNTY COMMUNITY COLLEGE COURSE SYLLABUS**

### **I. TITLE OF COURSE:** MT2406- MLT Clinical Chemistry

### **II. COURSE DESCRIPTION: 6 credit hours 3 credit hours of lecture and 3 credit hours of lab per week.**

This course will cover the physiology of the body and the biochemical reactions that are necessary for a healthy existence. The human condition is evaluated by biochemical shifts in different systems that maintain homeostasis during healthful periods. Basic interpretations of biochemistry and the concentration of enzymes, carbohydrates, lipids, proteins, electrolytes, blood gases, and therapeutic drug monitoring will be discussed. The student will perform routine clinical tests on biological fluids, maintain quality assurance records, and perform preventative maintenance on instrumentation.

For each unit of credit, a minimum of three hours per week with one of the hours for class and two hours for studying/preparation outside of class is expected.

Pre-requisite: Admission to the MLT Program.

### **III. PROGRAM AND/OR DEPARTMENT MISSION STATEMENT:**

The Seward County Community College Medical Laboratory Technology program provides a curriculum that produces competent, career entry level medical laboratory technicians.

### **IV. TEXTBOOK AND MATERIALS:**

Bishop, M, Fody, E, and Schoeff, L. Clinical Chemistry: Principles, Procedures, Correlations. Lippincott Williams and Wilkins: Baltimore 2018. 8th Ed.

### **V. SCCC OUTCOMES**

Students who successfully complete this course will demonstrate the ability to do the following SCCC Outcomes.

I: Read with comprehension, be critical of what they read, and apply knowledge gained to real life

II: Communicate ideas clearly and proficiently in writing, appropriately adjusting content and arrangement for varying audiences, purposes, and situations.

III: Communicate their ideas clearly and proficiently in speaking, appropriately adjusting content and arrangement for varying audiences, purposes, and situations.

IV: Demonstrate mathematical skills using a variety of techniques and technologies.

V: Demonstrate the ability to think critically by gathering facts, generating insights, analyzing data, and evaluating information

VI: Exhibit skills in information and technological literacy

IX: Exhibit workplace skills that include respect for others, teamwork competence, attendance/punctuality, decision making, conflict resolution, truthfulness/honesty, positive attitude, judgment, and responsibility

### **VI. COURSE OUTCOMES:**

Upon completion of the course the student will be able to:

1. Relate the proper specimen collection and handling, type of quality control used, reference ranges, principle of analysis currently available, and sources of analytical errors for each of the analytes discussed or approached in the course.
2. Perform all procedures with regard to prescribed safety protocol and confidentiality.
3. Correlate abnormal results with the most likely disease process by determining the clinical significance of the findings.
4. Outline the normal digestion, anabolism and catabolism of carbohydrates, proteins and lipids within the body.
5. Discuss the basic principles of laboratory instrumentation and state how they relate to the measurement of serum or body fluid analytes.
6. Demonstrate an understanding of the mechanism by which the body regulates water and pH homeostasis.
7. Discuss the anatomy and physiology of the following organ systems. State some of the common pathological states and what analyte measurements would be utilized to monitor the function of each: renal, cardiovascular, hepatic, thyroid, bone, and pancreatic.
8. List the reasons that therapeutic drugs are monitored and state the current drugs most often monitored and the procedure most often used.
9. Demonstrate the following skills as pertaining to each individual test that is listed.
  - A. Relate the proper specimen collection and handling techniques.
  - B. Perform acceptable quality control measures
  - C. State if results are within reference range
  - D. State principle of analysis of method available
  - E. State sources of error and methods to minimize or eliminate these errors.
  - F. Perform the analysis within  $\pm 2SD$  of the recognized mean for a control serum Proteins, enzymes, electrolytes, carbohydrates, lipids, non-protein nitrogen. Perform and calculate: creatinine clearance, anion gap, osmolality, dilutions, VLDL, LDL, Beers Law.
10. Explain the basic principles of laboratory instrumentation available in the clinical labs.
11. Perform routine preventative maintenance and troubleshooting procedure instruments available.
12. Determine if the results on different analytes are consistent as far as determining the status of the following organs or systems: renal, cardiovascular, hepatic, pancreatic, thyroid and bone.

## **VII. COURSE OUTLINE:**

### **Lecture**

1. Basic Laboratory Principles and Practices of Clinical Chemistry
  2. Laboratory Safety
  3. Specimen Collection and Processing
  4. Quality Control and Statistics
  5. Analytical Techniques and Instrumentation
  6. Automated Techniques
  7. Computer Interfacing in the Clinical Chemistry Laboratory
  8. Amino Acids and Proteins
  9. Enzymes
  10. Blood Gases, pH, and Buffer Systems
  11. Electrolytes
  12. Carbohydrates and Alterations in Glucose Metabolism
  13. Lipids and Lipoproteins
  14. Nonprotein Nitrogen
  15. Thyroid Function
  16. Pancreatic Function
  17. Therapeutic Drug Monitoring
- Identified units include studies of organ function and involve:
- A. Review of anatomy and physiology of organ or system
  - B. Pathological effects on system or organ
  - C. Analyte measurement and if applicable function studies for organ or system.

#### Laboratory

1. Basic Principles - Instrumentation, End point analysis, Kinetic measurements
2. Amino Acids and Proteins - Total Protein, Albumin, Troponin
3. Enzymes - Creatine Kinase, CK-MB, Lactate Dehydrogenase, Aspartate Aminotransferase, Alanine Aminotransferase, Alkaline Phosphatase, Acid Phosphatase, Gamma-glutamyltransferase
4. Electrolytes - Sodium, Potassium, Chloride,
5. Carbohydrates - Glucose, Glycosylated Hemoglobin
6. Lipids and Lipoproteins - Cholesterol, Triglyceride, HDL, VLDL, LDL
7. Non-protein Nitrogen - Urea, Creatinine, Uric Acid, Ammonia
8. Liver Function - Total Bilirubin, Direct Bilirubin
9. Pancreatic Function - Amylase, Lipase, Therapeutic Drug Monitoring

### **VIII. INSTRUCTIONAL METHODS:**

Lecture, case studies, computer tutorial, laboratory procedures, demonstration, self studies.

### **IX. INSTRUCTIONAL AND RESOURCE MATERIALS:**

Handouts, laboratory equipment and supplies, review questions, and selected reference Readings.

### **X. METHODS OF ASSESSMENT:**

Outcome #1 will be assessed and measured by class participation and writing assignments indicating comprehension of the material read.

Outcome #2 will be assessed and measured by written laboratory reports.

Outcome #3 will be assessed and measured by verbal communication with clinical instructors and of laboratory reports.

Outcome #4 will be assessed and measured by the student's ability to correctly perform clinical laboratory calculations.

Outcome #5 will be assessed and measured by the student's ability to correctly perform clinical chemistry procedures, determine validity of results and resolve discrepancies as encountered. Students will also be assessed on their ability to follow prescribed procedures for troubleshooting and problem solving.

Outcome #6 will be assessed and measured by the student's ability to properly and efficiently operate automated equipment and by the student's ability to locate and review articles(s) from professional publications relevant to the specified course work.

Outcome #9 will be assessed and measured by the completion of the Student Attitude Assessment tools by didactic and clinical instructor.

### **XI. ADA STATEMENT:**

Under the Americans with Disabilities Act, Seward County Community College will make reasonable accommodations for students with documented disabilities. If you need support or assistance because of a disability, you may be eligible for academic accommodations. Students should identify themselves to the Dean of Students at 620-417-1106 or going to the Student Success Center in the Hobbie Academic building, room 149 A.

Syllabus Reviewed: 3/26/2021