South Central College

MDLT 2818 Chemistry II

Course Outcome Summary

Course Information

Description This course is a continuation of MDLT 2817 Chemistry I and includes the theory and clinical correlations of acid/base balance, liver function, cardiac function, gastrointestinal function, pancreatic function, endocrinology, therapeutic drug monitoring, toxicology, tumor markers, nutritional assessment, biochemical assessment during pregnancy, and point-of-care testing, The MLT student learns the theory and technique of each procedure, quality control, and normal values of chemical constituents analyzed. Concepts that are basic to the operation of automated laboratory instruments will be discussed. (Prerequisites: MDLT 1810 & MDLT 2817 with a grade of C or higher.)

Total Credits 3

Total Hours 64

Types of Instruction

Instruction Type	Credits/Hours
Lecture	2/32
Lab	1/32

Pre/Corequisites

MDLT 1810 & MDLT 2817 with a grade of C or higher.

Institutional Core Competencies

Communication - Students will be able to demonstrate appropriate and effective interactions with others to achieve their personal, academic, and professional objectives.

Critical and Creative Thinking - Students will be able to demonstrate purposeful thinking with the goal of using a creative process for developing and building upon ideas and/or the goal of using a critical process for the analyzing and evaluating of ideas.

Course Competencies

1. Practice laboratory safety.

Learning Objectives

Discuss safety awareness for clinical laboratory personnel.
Choose appropriate personal protection equipment (PPE) when working in the laboratory.

Identify hazards found in the laboratory setting that are related to chemical, biologic, and radiologic materials.
Select the appropriate means for the disposal of waste generated in the laboratory.
Outline the steps required in documentation of an accident in the laboratory.

2. Describe the basic principles of instructor selected clinical chemistry testing methods/techniques used in the clinical chemistry laboratory.

Learning Objectives
Discuss existing clinical application of clinical chemistry testing methods/techniques determined by the instructor.
Compare and contrast clinical chemistry testing methods/techniques determined by the instructor.

3. Discuss the types of clinical chemistry testing methods/techniques used in the diagnosis of clinical diseases/disorders. This is at the instructor's discretion.

Learning Objectives
Discuss existing clinical applications of clinical chemistry testing methods/techniques determined by the instructor.
Compare and contrast clinical chemistry testing methods/techniques determined by the instructor.

4. Interpret, evaluate, and report patient outcomes using clinical chemistry testing methods/techniques.

Learning Objectives
Interpret, evaluate and report patient results per predetermined criteria.

5. Demonstrate standard quality assurance practices to ensure quality patient outcomes.

Learning Objectives
Explain the basic concepts of TQM (total quality management), including quality assurance (QA) and quality control (QC).
Calculate, interpret, and graph quality control (QC) measurements.
Apply appropriate corrective measurements to quality control (QC) errors.
Identify and discuss statistical quality assurance (QA) errors.

6. Calculate mathematical problems related to methods/techniques found in the clinical chemistry laboratory.

Learning Objectives
Define mathematical terms selected by the instructor.
Calculate mathematical problems selected by the instructor.

7. Discuss the general role and clinical significance of acid-base balance within the body, including measurement of common acid-base parameters.

Learning Objectives
Define terminology related to acid-base balance, pH, and the major buffering systems of the body.
State how the body attempts to regulate or compensate (kidney and lungs) for the various acid-base disorders.
Describe the significance of the hemoglobin-oxygen dissociation curve.
Discuss precautions in collecting and handling blood gas samples.
Discuss techniques commonly used to measure acid-base balance.
Discuss quality control of acid-base analyzers.

8. Discuss the basic anatomy and physiology of the liver, including the major functions of the liver, disorders of the liver, and laboratory assessment of liver function/dysfunction.

Learning Objectives
Define terminology related to liver function.
Briefly explain the anatomy of the liver.
Briefly explain the major physiologic functions of the liver.
Discuss major disorders of the liver.
Discuss basic assessment of liver function.

9. Discuss the basic anatomy and physiology of the cardiac system, its major disorders, laboratory assessment and common treatments.

Learning Objectives
Define terminology related to the cardiac system.

Briefly explain the anatomy of the heart and related blood vessels.
Discuss major disorders of the cardiac system.
Discuss basic laboratory assessment of the cardiac system.
Discuss common treatments of cardiac disorders.

10. Discuss the function of the pancreas in the body, major hormones produced, pancreatic disorders, and laboratory testing for pancreatic function.

Learning Objectives

Discuss the role of the pancreas in the digestive process.
List the major hormones produced by the pancreas and their physiologic roles.
Discuss common disorders of the pancreas and the associated laboratory tests that would aid in their diagnosis.

11. Discuss the physiology of gastrointestinal function, the role of gastric secretion, and the laboratory tests that evaluate both.

Learning Objectives

Describe the physiology and biochemistry of gastrin secretion.
List the laboratory tests used to assess gastric secretion and intestinal function.
Explain the clinical aspects of gastric analysis.

12. Discuss the functions of the endocrine system, components comprising the endocrine system, major hormones produced, hormone methodologies, and laboratory correlation of endocrine disorders.

Learning Objectives

Define terminology related to the endocrine system.
Identify the major components of the endocrine system.
Discuss the mechanisms of action and regulation of the major endocrine hormones.
List methodologies used in the evaluation of endocrine function.
Identify major disorders of the endocrine system.

13. Discuss the basic anatomy and physiology of the thyroid, laboratory testing and evaluation of major thyroid hormones, and major disorders of the thyroid.

Learning Objectives

Define terminology related to thyroid function.
Identify the major structures of the thyroid.
Discuss the biosynthesis, secretion, transport, action, and regulation of the major thyroid hormones.
List major thyroid function tests used in assessment of thyroid disease.

14. Discuss the function of the parathyroid, endocrine and organ physiology of calcium metabolism, clinical disease states of calcium metabolism, and laboratory testing for clinical disease states of calcium metabolism.

Learning Objectives

Describe the endocrine and organ physiology of calcium metabolism.
Discuss the clinical disease states associated with calcium metabolism.
List methodologies used in the evaluation of clinical disease states of calcium metabolism.

15. Discuss, identify, and define therapeutic drug monitoring (TDM) processes, including: TDM terminology, routes of administration, drug administration, drug distribution, drug elimination, specimen collection, pharmacokinetics, and therapeutic drug categories.

Learning Objectives

Define terminology related to therapeutic drug monitoring (TDM).
Identify, define, and discuss the factors that influence the following drug processes: routes of administration, absorption, distribution, and elimination.
Discuss the general principles of pharmacokinetics of drugs.
Discuss proper TDM specimen collection.
Name therapeutic categories of drugs and common drugs found in those categories.

16. Discuss, identify, and define the clinical significance and the toxic mechanisms of commonly encountered poisons.

Learning Objectives
Define toxicology and terminology related to toxicology.
List common routes of exposure.
Discuss dose response relationship.
Discuss toxicology of specific agents, therapeutic drugs, and drugs of abuse.

17. Explain the major clinical value of tumor markers.

Learning Objectives
Define terminology related to tumor markers.
Explain the role of tumor markers in cancer management.
List the properties of an ideal tumor marker.
List the major classifications of tumor markers.

18. Discuss, identify, define and appraise the biological role of vitamins. Include in the discussion the clinical significance of nutritional assessment.

Learning Objectives
Define toxicology and terminology related to toxicology.
List common routes of exposure.
Discuss dose response relationship.
Discuss toxicology of: specific agents, therapeutic drugs, and drugs of abuse.

19. Discuss, identify, define and appraise the clinical significance of the essential trace elements in the body.

Learning Objectives
Define terminology related to the essential trace elements.
State the biologic functions of the essential trace elements.
Discuss the clinical significance of the essential trace elements.
Discuss the homeostatic regulation of the essential trace elements.
Discuss specimen collection considerations and laboratory determinations of the essential trace elements.

20. Discuss the biochemical changes that occur during normal pregnancy and the role of the laboratory in assessing the health of the mother and fetus.

Learning Objectives
Describe the biochemical changes that occur during normal pregnancy.
Describe the chemical constitution, site of synthesis and function of the triple markers (hCG, estriol, and alpha-fetoprotein) during pregnancy.
Describe the analytical procedures and interpretation of results for hCG, estriol, and alpha-fetoprotein.
Discuss the laboratory procedures and the findings that could be of diagnostic value to the clinician for complications of pregnancy, including respiratory distress syndrome and gestational diabetes mellitus.

21. Discuss the impact of pediatric and geriatric patients on the clinical laboratory.

Learning Objectives
Define terminology related to pediatric and geriatric patients.
Discuss the problems associated with establishing reference ranges for pediatric and geriatric patients.
Discuss general biochemical and physiologic changes of aging.
Discuss general biochemical and physiologic developmental changes seen with pediatric patients.

22. Discuss automation in the clinical laboratory, including the stages of automated analysis and the critical points of automated analysis where errors are likely to occur.

Learning Objectives
Define terminology related to automation in the clinical laboratory.
Describe the stages of automated analysis.
Discuss critical points of automated analysis where errors are likely to occur.

23. Discuss the use of computers in the clinical laboratory, including the laboratory information system.

Learning Objectives

Relate uses of computers to processes in the clinical laboratory.
Define laboratory information system.

24. Discuss point-of-care testing (POCT), including the tests that are typically performed in a POCT laboratory and the pre-analytic, analytic, and post-analytic considerations of POCT.

Learning Objectives

Define point-of-care testing.
List tests that are typically performed in the point-of-care testing laboratory.
Contrast and compare the variables associated with pre-analytical, analytical, and post-analytical analysis.
Define the quality control associated with point-of-care testing, including electronic quality control and external quality control.

SCC Accessibility Statement

South Central College strives to make all learning experiences as accessible as possible. If you have a disability and need accommodations for access to this class, contact the Academic Support Center to request and discuss accommodations. North Mankato: Room B-132, (507) 389-7222; Faribault: Room A-116, (507) 332-7222.

Additional information and forms can be found at: www.southcentral.edu/disability

This material can be made available in alternative formats by contacting the Academic Support Center at 507-389-7222.