**BARTON COMMUNITY COLLEGE**

**COURSE SYLLABUS**

**SUMMER 2013**

1. **GENERAL COURSE INFORMATION**

Course Number: MLTC 1510

Course Title: MLT: Clinical Chemistry II

Credit Hours: 0 to 2

Prerequisite: CHEM 0802 Fundamentals of General Chemistry or equivalent

Division/Discipline: WTCE Division, Medical Laboratory Technician Program

Course Description: Clinical Chemistry involves the principles and procedures of quantitative analysis of blood and body fluids and their variations in health and disease. Students learn the different instrumentation available in the medical laboratory.

Variable Credit: Credit hour offering will vary according to student use of the Great Bend campus as their cooperative lab (0 credit hour lab and 2 credit hour course). It will also be used for assigning credit of similar Clinical Laboratory Science or Medical Laboratory Technician courses from other accredited programs based on syllabus comparison.

# **CLASSROOM POLICY**

Students and faculty of Barton Community College constitute a special community engaged in the process of education. The College assumes that its students and faculty will demonstrate a code of personal honor that is based upon courtesy, integrity, common sense, and respect for others both within and outside the classroom.

The College reserves the right to suspend a student for conduct that is detrimental to the College's educational endeavors as outlined in the College catalog.

Plagiarism on any academic endeavors at Barton County Community College will not be tolerated. Learn the rules of, and avoid instances of, intentional or unintentional plagiarism.

Anyone seeking an accommodation under provisions of the Americans with Disabilities Act should notify Student Support Services. Additional information about academic integrity can be found at the following link:

<http://academicintegrity.bartonccc.edu/>

# **COURSE AS VIEWED IN THE TOTAL CURRICULUM**

Chemistry II is one of a series of technical courses for the Medical Laboratory Program. The course is designed to understand the instrumentation, quality control, and safety to become competent to perform job skills in the clinical laboratory.

Students planning to transfer credit for a baccalaureate degree will be granted transfer credit only as determined by the four year institution.

The transferability of all college courses will vary among institutions, and perhaps even among departments, colleges, or programs within an institution. Institutional requirements may also change without prior notification. Students responsible to obtain relevant information from intended transfer institutions to ensure that the courses the student enrolls in are the most appropriate set of courses for the transfer program.

1. **ASSESSMENT OF STUDENT LEARNING**

Barton Community College is committed to the assessment of student learning and to quality education. Assessment activities provide a means to develop an understanding of how students learn, what they know, and what they can do with their knowledge. Results from these various activities guide Barton, as a learning college, in finding ways to improve student learning.

1. Use common clinical chemistry terminology associated with blood gases, mineral metabolism and determine suitability of specimens for chemical analysis:
   1. Define or identify terms related to acid-base balance and blood gas analysis.
   2. Describe the major processes by which the body maintains acid-base balance, including the role of buffer systems, the respiratory system, and the renal system.
   3. Briefly discuss issues related to collection and handling of specimens for pH and blood gases analysis.
   4. Describe the basic theory of operation, and summarize the essential components for a pH electrode system, pO2 electrode system, pCO2 electrode system.
   5. Describe the reference ranges and critical values for the blood pH, pO2 and pCO2.
   6. Briefly describe respiratory acidosis, respiratory alkalosis, metabolic acidosis, and metabolic alkalosis and give examples of causative situations; state how the body attempts to compensate for the condition.
   7. Perform blood gas analysis and analyze results to determine whether data are normal or represent metabolic or respiratory acidosis or metabolic or respiratory alkalosis.  Identify whether the data represent an uncompensated or a compensated condition.
   8. Briefly describe the chemical nature of:  calcium; phosphate; magnesium; lithium; iron
   9. Describe the major physiology for calcium, phosphate, magnesium, lithium and iron, including regulation and distribution
   10. List the common methods of analysis for calcium, phosphate, magnesium, lithium, and iron and describe the basic principles of selected methods
   11. Describe the normal ranges for calcium, phosphate, magnesium, lithium and iron, as given in lecture
   12. Note the major clinical significance of abnormal levels of calcium, phosphate, magnesium, lithium, and iron
   13. Perform analysis of selected minerals and analyze results to determine if within acceptable range or abnormal results. Perform maintenance, calibration and quality control on instrumentation to determine mineral analysis.
   14. Identify the basic processes involved in an automated chemical analysis
2. Follow established quality control procedures, perform testing including maintenance and calibration:
   1. Define terms related to clinical chemistry automation, including but not limited to the following:  analytical sensitivity; analytical specificity; analytical throughput; batch analyzer; bi-directional interface; carryover; centrifugal analyzer; clinical sensitivity; clinical specificity; closed tube sampling; delta checking; downtime; laboratory information system; post-analytical; pre-analytical; random access analyzer; test menu; turnaround time
   2. Perform automated chemical analysis and assess calibration, quality control and patient values.
3. Recognize and define terms related to electrophoresis and immunoassays:
   1. Define electrophoresis and list the major components of an electrophoresis system
   2. List and briefly discuss the major concepts affecting electrophoresis
   3. Identify the bands of protein electrophoresis as produced on cellulose acetate at pH 8.8
   4. Identify normal and abnormal protein electrophoresis patterns, as produced on cellulose acetate at pH 8.8
   5. Briefly describe the technique and clinical application for high resolution protein electrophoresis, urine protein electrophoresis, cerebrospinal fluid protein electrophoresis, isoenzyme electrophoresis, lipoprotein electrophoresis, hemoglobin electrophoresis, isoelectric focusing, counterimmunoelectrophoresis, immunoelectrophoresis, immunofixation electrophoresis, rocket immunoelectrophoresis and immunoblot
   6. Perform virtual electrophoresis and determine electrophoretic pattern.
   7. Identify and define common terms associated with immunoassays, including:  affinity, antibody, antigen, avidity, cross reactivity, epitope, hapten, monoclonal, polyclonal, postzone, prozone, specificity
   8. Briefly describe the principles of immunoassays including:  immune precipitation in gel, fluid-phase antigen-antibody complexes, radioimmunoassay, enzyme immunoassay, fluorescence immunoassay, luminescent immunoassay
   9. Briefly describe the classification of immunoassays as competitive versus noncompetitive
   10. Briefly describe the classification of immunoassays as homogenous versus heterogenous
   11. Briefly describe three methods used to separate free labeled reagent from bound labeled reagent
   12. Identify and define common terms associated with nucleic acid probes, including:  amplicon, hybridization, nucleic acid probe
   13. Briefly describe the functions and chemical nature of DNA and RNA
   14. Briefly describe the classification of nucleic acid probe techniques as unamplified versus amplified
   15. Perform automated immunoassay analysis and assess calibration, quality control and patient values.
4. Describe the various tests available for specialty testing in the laboratory:
   1. List and identify the hormones synthesized by the thyroid and chemical nature
   2. Briefly outline the normal physiology of the thyroid hormones as related to synthesis and regulation.
   3. List the common methods of analysis for thyroid hormones and briefly describe the basic principles of selected methods.
   4. Briefly describe the clinical application of thyroid hormone analysis (e.g. hyperthyroidism, hypothyroidism, autoimmune thyroiditis, newborn screening).
   5. Briefly outline normal heme synthesis.
   6. Discuss common methods of analysis for the porphyrins and briefly describe the basic principles of selected methods.
   7. Briefly describe the clinical application of porphyrins analysis (e.g. porphyrinopathies; lead poisoning).
   8. Define drug, therapeutic range, state the purpose of therapeutic drug monitoring and laboratory applications of clinical pharmacology.
   9. List laboratory applications of forensic pharmacology.
   10. Briefly describe the factors affecting the blood level of an administered drug, define plasma half-life and steady state.
   11. Briefly summarize concepts of laboratory analysis for drugs, identify therapeutic application of selected drugs frequently monitored in the clinical setting, and drugs commonly encountered in acute intoxication and drug abuse screening.
   12. Define poison and list the major classes of poisons.
   13. Define cancer and identify specific circulating tumor markers.
   14. Identify the utilization of analysis of tumor markers in identifying and treatment of specific tumors.
   15. Briefly summarize concepts of laboratory analysis of tumor markers and specific methodologies utilized in analysis of tumor markers.
   16. Perform automated chemical analysis of thyroid hormones, therapeutic drugs and selected poisons and tumor markers (if available) and assess calibration, quality control and patient values.
5. **INSTRUCTOR EXPECTATIONS OF STUDENTS IN CLASS**
6. **TEXT AND OTHER REQUIRED MATERIALS**
7. REFERENCES
8. **METHODS OF INSTRUCTION AND EVALUATION**

###### ATTENDANCE REQUIREMENTS

# **COURSE OUTLINE**

**SYLLABUS ADDENDUM**

Course Number: MLTC 1510

Course Title: MLT: Clinical Chemistry II

Instructor: Louise Masden, MS, MT(ASCP), RN

Academic Term: Spring 2008

# **ADDENDUM TO SECTION III**

##### Course Transferability to Regent Universities

**MLTC 1511** at BCCC is equivalent to:

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| INSTITUTION | EQUIVALENT COURSE(s) a | SOURCE(s) OF INFORMATION b |
| Emporia State University | Free elective | Transferring to ESU from BCCC  Fall 1997 |
| Fort Hays State University | -- | FHSU Course Equivalency System  4-20-98 |
| Kansas State University | -- | KSU Website  10-22-98 Update |
| Pittsburg State University | General elective | Transfer to Pittsburg State University  Equivalency Guide for BCCC 09-97 |
| University of Kansas | -- | KU Website  10-30-97 Update |
| Wichita State University | Free elective | Transfer Course Equivalencies  BCCC to WSU 09-98 |

a Highlighted (**boldface** font) courses may be used at the institution to fulfill general education requirements.

b Include both the name (location) and date of the source of information