BARTON COMMUNITY COLLEGE
COURSE SYLLABUS

I. GENERAL COURSE INFORMATION

Course Number: MLTC 1504
Course Title: MLT Clinical Chemistry
Credit Hours: 6
Prerequisite: Fundamentals of General Chemistry and General Microbiology and Anatomy & Physiology or equivalents, passed with a minimum of a C or instructor permission.
Division/Discipline: Workforce Training and Community Education Division, Medical Laboratory Technology Program.
Course Description: 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. Hands-on laboratory time is required.

II. INSTRUCTOR INFORMATION

III. COLLEGE POLICIES

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.

Plagiarism on any academic endeavors at Barton Community College will not be tolerated. The student is responsible for learning the rules of, and avoiding instances of, intentional or unintentional plagiarism. Information about academic integrity is located in the Student Handbook.

The College reserves the right to suspend a student for conduct that is determined to be detrimental to the College educational endeavors as outlined in the College Catalog, Student Handbook, and College Policy & Procedure Manual. (Most up-to-date documents are available on the College webpage.)

Any student seeking an accommodation under the provisions of the Americans with Disability Act (ADA) is to notify Student Support Services via email at disabilityservices@bartonccc.edu

IV. COURSE AS VIEWED IN THE TOTAL CURRICULUM

This course is one of a series of technical courses for the Medical Laboratory Technology Program. It is designed to aid the student in the development of knowledge, competencies and critical thinking related to chemistry analytes, instrumentation, quality control, safety and human physiology relating to disease states. Students will develop job-oriented skills and safety practices for medical laboratory testing. This course includes information, at a minimum, from the current Body of Knowledge for Medical Laboratory Technicians.

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 are 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.

V. 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.

<u>Course Outcomes, Competencies, and Supplemental Competencies</u>

A. 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.
   1. Evaluate the following:
      a. Carbohydrates
      b. Lipids
      c. Proteins
      d. Enzymes
      e. Non-protein nitrogens
      f. Electrolytes and trace elements
      g. Acid-base and blood gas studies
      h. Therapeutic drug monitoring and toxicology
      i. Synthesis and metabolism of hemoglobin
      j. Body fluids
      k. Endocrinology
      l. Genetic disorders.

B. Perform all procedures with regard to prescribed safety protocol and confidentiality.
   1. Exhibit safe laboratory practices according to established laboratory protocol.
   2. Demonstrate proper affective behavior.
   3. Exhibit professional conduct and positive interpersonal communication skills with patients, laboratory personnel and other health care professionals.

C. Correlate abnormal results with the most likely disease process by determining the clinical significance of the findings.
   1. Evaluate case studies to include the most likely disease process.

D. Outline the normal digestion, anabolism and catabolism of carbohydrates, proteins, and lipids within the body.
   1. Describe tests and methods used to measure these processes and parameters.

E. Discuss the basic principles of laboratory instrumentation and state how they relate to the measurement of serum or body fluid analytes to include but not limited to the following.
   1. Describe how and when to use a spectrophotometer/photometer.
   2. Describe the principles of instrument electronics and troubleshooting techniques.
   3. Describe how and when to use a fluorometer.
   4. Describe how and when to use an osmometer.
   5. Describe how and when to use a pH meter.
   6. Describe how and when to use a blood gas analyzers.
   7. Describe how and when to use a refractometer.
   8. Describe the principles of balances.
   9. Describe the principles of centrifuges.
   10. Describe the principles of heating units.
   11. Describe the principles of electrophoresis.
   12. Describe the principles of chromatography.
   13. Describe the principles of automated analyzers.
   14. Describe how and when to use densitometry/nephelometry.
   15. Describe how and when to use coulometry.
   16. Describe the principles of molecular measuring.

F. Demonstrate an understanding of the mechanism by which the body regulates water and pH homeostasis.
   1. Describe homeostasis.
   2. Evaluate water regulation and disease states.

G. Discuss the anatomy and physiology of the following organs or 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.
   1. Contrast past testing procedures to current procedures to monitor each of the above organs or systems.

H. List the reasons that therapeutic drugs are monitored and state the current drugs most often monitored and the procedure most often used.
   1. Compare and contrast current drug monitoring and measurement with historical procedures.

I. Demonstrate the following skills as pertaining to each individual test that is listed.
   1. Relate the proper specimen collection and handling techniques.
   2. Perform acceptable quality control measures.
   3. Determine if results are within the acceptable reference range.
   4. State the principle of analysis of the method available.
   5. State sources of error and methods to minimize or eliminate these errors.
   6. Perform the analysis within +/- 2SD of the recognized mean for a control serum; proteins, enzymes, electrolytes, carbohydrates, lipids, non-protein nitrogens.
   7. Perform & Calculate: creatinine clearance, anion gap, osmolarity, dilutions, VLDL, LDL, and Beers Law.

J. Explain the basic principles of laboratory instrumentation available in the clinical labs to include, but not limited to, the following.
   1. Describe spectrophotometer/photometer.
   2. Describe electronics and troubleshooting techniques.
   3. Describe a fluorometer.
   4. Describe an osmometer.
   5. Describe a pH meter.
   6. Describe the principles of blood gas analyzers.
   7. Describe a refractometer.
   8. Describe several balances.
   9. Describe several centrifuges.
   10. Describe heating units used with a human laboratory setting.
   11. Describe electrophoresis and when it can be used.
   12. Describe chromatography.
   13. Describe different analyzers used in the human laboratory.
   14. Describe densitometry/nephelometry.
   15. Describe coulometry.
   16. Define molecular chemistry in relation to the human laboratory testing.

K. Perform routine preventative maintenance and troubleshooting procedures on the instruments available.
   1. Compare preventative maintenance to daily, weekly, monthly maintenance.

L. Determine if the results of different analytes are consistent as far as determining the status of the following organs or systems: renal, cardiovascular, hepatic, pancreatic, thyroid and bone.
   1. Analyze and compare tests for organ disease involvement.

M. Define, identify and describe common clinical chemistry terminology as it relates to the point of care and clinical laboratory environment; to include but not limited to the following.
   1. Define Quality Control.
   2. Define Quality Assurance.

VI. INSTRUCTOR'S EXPECTATIONS OF STUDENTS IN CLASS

VII. TEXTBOOKS AND OTHER REQUIRED MATERIALS

VIII. REFERENCES

IX. METHODS OF INSTRUCTION AND EVALUATION

X. ATTENDANCE REQUIREMENTS

XI. COURSE OUTLINE