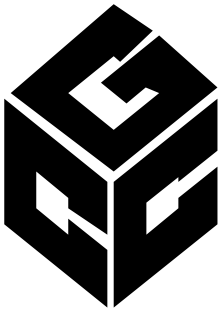

GRAYSON COUNTY COLLEGE

MLAB 2501

CHEMISTRY

FALL 2016

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GRAYSON COUNTY COLLEGE
MEDICAL LABORATORY TECHNOLOGY
MLAB 2501 CLINICAL CHEMISTRY
LECTURE HOURS PER WEEK - 3
LABORATORY HOURS PER WEEK - 6

TEXTBOOKS:

Required:

1. Bishop, Fody, Schoeff, Clinical Chemistry: Principles, Procedures, Correlations. Seventh Edition, Philadelphia: Lippincott Williams and Wilkins, 2013.

Supplemental textbooks are available in MLT Library or Instructor's Office

COURSE DESCRIPTION:

MLAB 2501. Clinical Chemistry. (3-6-5). An introduction to the principles and procedures of various tests performed on Clinical Chemistry. Presents the physiological basis for the test, the principle and procedure for the test and the clinical significance of the test results, including quality control and normal values. Also includes basic chemical laboratory technique, chemical laboratory safety, electrolytes and acid-base balance, proteins, carbohydrates, lipids, enzymes, metabolites, endocrine function, and toxicology. Prerequisites: MLAB 1201, MATH 1314, and CHEM 1406 or CHEM 1311 and CHEM 1111. (RM)

LEARNING OUTCOMES:

Exhibit a knowledge of human body chemistry levels under healthy and abnormal conditions; evaluate the suitability of clinical specimens; and explain and perform procedures routinely found in a clinical chemistry laboratory, including electrolytes, acid-base balance, proteins, enzymes, carbohydrates, lipids, toxicology, therapeutic drug monitoring, and liver, kidney, and endocrine functions. Evaluate laboratory test outcomes and correlate test results with patient condition(s).

GOALS:

1. To perform routine clinical chemistry procedures and verify with a quality assurance program in accordance with established standards of service.
2. To apply the problem solving approach to distinguish situations that necessitate independent action from those that require referral to a supervisor.
3. To display a professional attitude toward colleagues.
4. To prepare records, transmit results accurately and demonstrate an understanding of the importance of documentation in the clinical laboratory.
5. To demonstrate interpersonal communication skills with fellow students and the instructor.

OBJECTIVES:

Terminal Performance Objectives (TPOs)

Upon completion of the assignments and participation in class discussion, the student should be able to answer at least 70% of the questions on a multiple choice examination over Clinical Chemistry.

Course Learning Objectives:

After reading each chapter, participating in class discussion, and answering the review questions, the student should be able to accomplish the objectives stated online for each chapter.

When you go to the course content on Blackboard each unit will have a set of objectives. Print these out and use them to study the course materials. Exam questions are created from the course objectives. The following affective objectives pertain to the classroom and clinical components:

1. Demonstrate professionalism by
   a. complying with the attendance policy
   b. complying with the dress code
   c. submitting assignments by the stated deadline

2. Demonstrate enthusiasm and interest in the profession of chemistry by asking questions, participating in class discussions and meeting with professors during office hours as needed.
3. Demonstrate initiative by reviewing objectives and completion of reading assignments prior to class.
4. Demonstrate progression in laboratory skills by effective organization, coordination of multiple tasks and insightful evaluation of results obtained.
5. Utilize constructive criticism to correct deficiencies and improve performance.
6. Work cooperatively with professors and fellow students to achieve the goals of each activity assigned.
7. Participate in activities designed to advance the profession of CLS and build professional pride.
8. Participate in activities to encourage an ongoing involvement in professional development.

Campus Lab Objectives

For each procedure performed in the campus lab:

1. Identify the test performed (by name) and the method utilized
2. State a brief description of the principle
3. Using the principle, deduce the method reaction
4. List reagents, including concentrations, and safety warnings
5. Cite other common methods available
6. State the sample requirements
7. Outline the procedure utilizing serum as the required sample
8. Describe the method specificity, including the effects, if any, by hemoglobin, bilirubin, lipids and drugs
9. State the linearity for the method performed
10. Identify the Normal Range/Reference Range for all ages, sexes and specimens, where applicable, including reportable units
11. Demonstrate proper operation of the spectrophotometer
12. Calculate the results using values obtained from the spectrophotometer readings
13. Compare your results with the known values
14. Investigate reasons why results are not comparable to control values
15. Resolve discrepancies between measures and states values
16. Aid in the cleanup of workstation and replacement of supplies and equipment

PLACEMENT:

Fall Semester of the Sophomore Year

PREREQUISITES:

SEE COURSE DESCRIPTION

METHODS AND PROCEDURES OF INSTRUCTION:

Lecture-Discussion and laboratory sessions will be correlated so that the 9 hours per week will be utilized to the best advantage. Visual aids will be used to reinforce the presented material. Campus laboratory experience, demonstration, textbooks, periodicals, and workshops (when available) will be utilized.

The student may be required to do some independent research.

EVALUATION OF STUDENT ACHIEVEMENT OF OBJECTIVES

LECTURE:

Evaluation will be written quizzes and examinations. The final examination will be a comprehensive examination over objectives covered in MLAB 2501.

CAMPUS LAB:

Evaluation of these objectives may be by practical or written examination. Lab Report forms should be completed and are due one week after the lab is performed. Any lab turned in after that time is considered late and will have 5 points taken off the grade for each day class/lab is scheduled.

Any work done as a class or lab assignment will not be accepted for credit after the date scheduled for the final exam.

COURSE GRADE WILL BE DETERMINED BY THE FOLLOWING PROCESS:

Category	*Number*	*Each Worth (pts)*	*Total*
Exams	10	50	500
Daily Quizzes	10	10	100
Comprehensive Final	1	100	100
Assignments	8	25	200
Campus Lab	1	100	100
		Total Points = 1000	

In order to pass the course, an average of 70% must be achieved on the Chemistry Unit Tests.

NUMERICAL VALUE OF GRADES:

A	=	899.5 – 1000.0
B	=	799.5 – 899.4
C	=	699.5 – 799.4
D	=	599.5 – 699.4
F	=	0 – 599.4

COURSE REQUIREMENTS:

In order to achieve a passing grade, the following requirements must be met.

1. Satisfactory **Campus Lab performance** (A grade of 70% or better)
2. Completion of a **Comprehensive course final** covering all subject areas studies in MLT to date
3. An overall average grade of 70% or better must be achieved on the Chemistry Unit Exams.

4. The student will be expected to turn in all completed lab assignments, records, documents, handouts, etc.
5. **Regular attendance** for lecture and Campus Lab is required. Responsibility for work missed because of illness or school business is placed upon the student. More than two (2) absences are considered to be excessive
6. A grade of "C" or better is **required for graduation**.

ASSIGNMENTS:

1. Read each chapter as it is assigned. (See Lecture and Exam Schedule)
2. Review the Chapter Outline found at the beginning of each chapter.
3. Study the objectives found online for each chapter.
4. When assigned, look up the definitions for the Key Words found at the beginning of the chapter and turn in for credit. Review the terms using the online flashcards. The definitions will be due on the day of the exam over the assigned chapters.
5. Practice the online Quiz Bank for each chapter.

ASSIGNED READING

The student should pay particular attention to the assigned reading that specifically relates to the objectives. Other reading may be skimmed or used for reference in the future.

COURSE OUTLINE

1. Clinical Chemistry

   A. Chapter 1 – Basic Principles and Practices
   B. Chapter 2 – Laboratory Safety and Regulations
   C. Chapter 3 – Method Evaluation
   D. Chapter 4 – Lean Six Sigma Methodology for Quality Improvement in the Clinical Chemistry Laboratory
   E. Chapter 5 – Analytic Techniques
   F. Chapter 6 – Chromatography and Mass Spectrometry
   G. Chapter 7 – Principles of Clinical Chemistry Automation
   H. Chapter 8 – Immunochemical Techniques
   I. Chapter 9 – Molecular Theory and Techniques
   J. Chapter 10 – Point of Care Testing
   K. Chapter 11 – Amino Acids and Proteins
   L. Chapter 12 – Nonprotein Nitrogen Compounds
   M. Chapter 13 – Enzymes
   N. Chapter 14 – Carbohydrates
   O. Chapter 15 – Lipids and Lipoproteins
   P. Chapter 16 – Electrolytes
   Q. Chapter 17 – Blood Gases, pH and Buffer Systems
   R. Chapter 18 – Trace Elements
   S. Chapter 19 – Porphyrins and Hemoglobin
   T. Chapter 20 – Hypothalamic and Pituitary Function
   U. Chapter 21 – Adrenal Function
   V. Chapter 22 – Gonadal Function
   W. Chapter 23 – The Thyroid Gland
   X. Chapter 24 – Calcium Homeostasis and Hormonal Regulation
   Y. Chapter 25 – Liver Function
   Z. Chapter 26 – Laboratory Markers of Cardiac Damage and Function
   AA. Chapter 27 – Renal Function
   BB. Chapter 28 – Pancreatic Function and Gastrointestinal Function
   CC. Chapter 29 – Body Fluid Analysis
   DD. Chapter 30 – Therapeutic Drug Monitoring
   EE. Chapter 31 – Toxicology
   FF. Chapter 32 – Circulating Tumor Markers: Basic Concepts and Clinical Applications
   GG. Chapter 33 – Nutritional Assessment

SCANS:

The U.S. Department of Labor has established the Secretary's Commission on Achieving Necessary Skills (SCANS) to ensure that students are gaining competencies that are required in the work place. The following competencies will be acquired upon completion of this course.

INTEGRATION OF SCANS COMPETENCIES
WITH COURSE GOALS, OBJECTIVES, AND ACTIVITIES

COURSE NUMBER MLAB 2501
COURSE NAME Clinical Chemistry

SCANS COMPETENCIES AND FOUNDATION SKILLS	**COURSE GOALS, OBJECTIVES, AND ACTIVITIES**
RESOURCES	
ALLOCATES TIME	Performs routine laboratory tests
ALLOCATES MONEY	
ALLOCATES MATERIAL AND FACILITY RESOURCES	Performs routine laboratory tests
ALLOCATES HUMAN RESOURCES	
INFORMATION	
ACQUIRES & EVALUATES INFORMATION	Prepares records Distinguishes situations that necessitate independent action from those that require referral to a supervisor
ORGANIZES & MAINTAINS INFORMATION	Prepares records
INTERPRETS & COMMUNICATES INFORMATION	Prepares and transmits records
USES COMPUTERS TO PROCESS INFORMATION	Completes tutorials on topics included in course Studies review questions on related topics
INTERPERSONAL	
PARTICIPATES AS A MEMBER OF A TEAM	Displays a professional attitude Cooperates with instructor and other students to maintain campus lab

TEACHES OTHERS	Presents case studies on related topics
SERVES CLIENTS/CUSTOMERS	
EXERCISES LEADERSHIP	Participates in class activities
NEGOTIATES TO ARRIVE AT DECISION	Participates in class activities
WORKS WITH CULTURAL DIVERSITY	Displays a professional attitude
SYSTEMS	
UNDERSTANDS SYSTEMS	Describes principles and application of instrumentation used in the laboratory Explains importance of quality assurance in the laboratory Practices Universal Precautions States reasons for performing a routine urinalysis
MONITORS & CORRECTS PERFORMANCE	Obtains results within limits set
IMPROVES & DESIGNS SYSTEMS	Demonstrates increasing dexterity, accuracy and speed
TECHNOLOGY	
SELECTS TECHNOLOGY	Chooses equipment and supplies needed to perform task
APPLIES TECHNOLOGY TO TASK	Uses equipment and supplies to perform test Establishes standard curves
MAINTAINS & TROUBLESHOOTS TECHNOLOGY	Keeps equipment clean and in good working order
BASIC SKILLS	
READING	Follows written instructions
WRITING	Prepares reports
ARITHMETIC	Does simple problems
MATHEMATICS	Becomes proficient in the use of mathematical manipulations used in the clinical laboratory to include basic mathematics, conversion factors, dilutions, solutions, logarithms, graphs,

	and specific calcultions for selected tests.
LISTENING	Follows verbal instructions
SPEAKING	Communicates with others
THINKING SKILLS	
CREATIVE THINKING	
DECISION MAKING	Distinguishes situations that necessitate independent action from those that require referral to a supervisor
PROBLEM SOLVING	Applies problem solving approach to make decisions Practices problem solving in all areas of laboratory math
SEEING THINGS IN THE MIND'S EYE	Solves mathematical problems Observes urine sediment Acquires knowledge of instrumentation used in the laboratory
KNOWING HOW TO LEARN	Becomes proficient in laboratory mathematics Follows written and verbal instructions
REASONING	Evaluates procedures
PERSONAL QUALITIES	
RESPONSIBILITY	Arrives for class on time Follows safety rules and regulations Completes assignments
SELF-ESTEEM	Displays professional attitude
SOCIABILITY	Communicates with instructor and other students
SELF-MANAGEMENT	Prepares records Displays professional attitude
INTEGRITY/HONESTY	Displays professional attitude Records results exactly as determined

GRAYSON COUNTY COLLEGE
CHEMISTRY LAB REPORT FORM

Name: _____ **Date:** _____

Test Name: _____ **Method:** _____

Instructions: Complete all information below. You may use package inserts and your textbook as a reference (Do not copy verbatim). Use additional sheets, if necessary, and attach to this sheet.

1). Brief Principle Description (narrative - 10 points): _____

_____

_____

2). Method Reaction (10 points): _____

_____

3). List reagents, including concentrations, and safety warnings (10points):

	Concentration	Reagent	Safety Warnings
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			

4). Other Common Methods (8 points): _____

_____

5). Sample Requirements (8 points): _____

6). Procedure Description for Serum (8 points):

Step #1: _____
Step #2: _____
Step #3: _____
Step #4: _____
Step #5: _____
Step #6: _____
Step #7: _____
Step #8: _____

7). Specificity, including the effects, if any, by hemoglobin, bilirubin, lipids and drugs (8 points):

_____
_____
_____

8). Linearity (8 points): _____
_____

9). Normal Range/Reference Range for all ages, sexes and specimens, where applicable, including units (8 points):

_____
_____
_____
_____
_____
_____

10). Results (14 points):

	Absorbance Values	**Concentrations**
Blank		
Standard	_____	_____
Control _____	_____	_____
Control _____	_____	_____
Unknown _____	_____	_____
Unknown _____	_____	_____
Unknown _____	_____	_____

Show all Calculations:

11). Cleanup of Workstation and Replacement of Supplies and Equipment (8 points)

TOTAL POSSIBLE POINTS = 100