

**The University of Texas at El Paso**  
**College of Health Sciences**  
**Clinical Laboratory Science Program**  
**Clinical Chemistry I (CLSC 3354)**  
**Fall 2009**

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**Lectures:** (Attendance required) Tuesday and Thursday, 9:00 – 10:20 a.m.

**Office hours:** Tuesday and Thursday, 12:00 – 1:00 p.m. and by appointment.

**Textbook:** **Clinical Chemistry: *Theory, Analysis, Correlation*, 4<sup>th</sup> edition**

Authors: Kaplan, Pesce, and Kazmierczak

Publisher: Mosby

**Course Overview:**

This course is the first part of a two semester Clinical Chemistry courses. This course will discuss and examine various instrumentation methods used in the analysis of body fluids. Chemical laboratory fundamentals and procedures are presented and related to normal and abnormal human physiology and biochemistry. The conceptual correlation between in vivo processes and in vitro analysis to yield accurate and precise information about the clinical status of the human body will also be discussed.

**Some hints on how to succeed in this course**

It is essential to develop good study skills in order to succeed in any course you take.

Good study skills not only save you time and energy, but also help you learn more effectively. Four study skills that will promote your learning are self-management, constructing good notes, reading to learn, and studying with others.

***Self-management techniques:***

It is critical that you will manage your time wisely. Organize yourself by planning a schedule. In this schedule you may want to record time for reading, reviewing and studying for tests. Adjust your schedule as the course progresses. Pace the course workload evenly. Use a study location free of distractions and review periodically.

***Creating useful notes***

Identify new ideas, summarize main ideas from lecture or text, create outlines, flow charts, trees, concepts; underline selectively and rewrite your notes. Power point handouts alone are not sufficient to master the material presented and the student must attend class and take notes.

### ***Reading to learn***

Determine your purpose for reading; preview the text (titles, summaries, diagrams); turn titles and headings into questions; read for main ideas; re-read, visualize, relate; review.

### ***Study with others***

Study groups is one of the best ways of learning. Review the subject, formulate questions, and discuss main ideas. Test each other for knowledge. Explain what you have learned to others. If you can clearly explain the material you have learned, then you can be sure you know your material well.

## **Course Objectives:**

Upon completion of this course, the student should be able to:

### ***A. Cognitive***

1. Recognize the normal ranges or reference intervals for major analytes.
  - 1) List the normal ranges or reference intervals for major analytes
  - 2) Utilize the normal ranges or references to evaluate abnormal results
  - 3) Evaluate the possibility of reporting the patients' results
  - 4) Recognize any discrepancy in results
  - 5) Interpret results in a timely manner
2. Demonstrate and apply knowledge of quality control
  - 1) Select the appropriate controls for tests
  - 2) Interpret the chart of the controls to identify problems
  - 3) Formulate plan for corrections
  - 4) Follow instructions to obtain quality control
  - 5) Analyze and record all data obtained
3. Consider the pre-analytical, analytical and post-analytical factors that affect patient's results.
  - 1) Identify sample integrity and factors that affect sample's integrity
  - 2) Recognize interfering substances or sources of errors in the methods used.
  - 3) Prioritize and differentiate between the stat and routine samples
  - 4) Evaluate the role of the technologist in monitoring these three phases
  - 5) Participate in produce strategic plans to diminish the factors that affect patient's results
4. Correlate all patient data, principles of laboratory testing and diseases
  - 1) Discuss the principles of chemical methods and describe the reference value of method
  - 2) Compare the patient data with reference values
  - 3) Integrate the patient abnormal results with related diseases.
  - 4) Debate and resolve clinical cases
  - 5) Investigate the recent literature
5. Understand and interpret the different human physiological systems; analyze the data obtained to identify the pathological processes.
  - 1) summarize the major functions of organs and hormones
  - 2) Analyze the organ function and the response to illness
  - 3) Integrate the laboratory disease with pathological processes

- 4) Suggest other or alternative lab tests if necessary
  - 5) Examine all data to confirm results
6. Make an appropriate decision and recommendation based on results obtained.
- 1) Repeat method if necessary
  - 2) Analyze data for appropriate decision
  - 3) Justify the decision
  - 4) Process the test with precision

### ***B. Affective***

To show the appropriate responsible behaviors, students will demonstrate:

1. A positive attitude by being prepared for lecture and laboratory sessions completing assigned tasks on time and displaying self-motivation.
2. Organization by utilizing time effectively, sequencing and prioritizing tasks for completion with time constraints and maintaining a neat clean work.
3. Attention to detail by diligently pursuing accuracy and documenting data accurately and legibly.
4. Problem solving ability by explaining purpose of each step in diagnosis, interpretation, procedure, recognizing discrepancies in techniques or procedures and repeating necessary lab tests when necessary.
5. Dependability by following directions, working independently after being given directions.
6. Stability and self-confidence by approaching and performing routine tasks confidently without assistance and maintaining composure.
7. Appropriate interpersonal skills by cooperating and communicating effectively with classmates and instructors and displaying courteous, considerate behavior and appropriate appearance.
8. Ethical behavior and integrity by respecting confidentiality of patient information, complying with professional standards and code of ethics, adhering to safety policies and abiding by all rules and regulations of the institution.

### ***C. Psychomotor***

1. Select reagents, perform procedures, interpret results, and evaluate the significance of tests performed in the clinical chemistry lab.
2. Describe the procedure (see examples below), correctly calibrate and operate equipment, interpret results, and evaluate the significance of results for the tests listed below:  
Spectrophotometry, luminometry, immunoelectrophoresis, Radioactivity, Electrophoresis.  
Glucose determination, protein concentration, liver enzymes, cardiac enzymes, bilirubin, cholesterol, triglycerides and others.
3. Define terms and describe quality control procedures as they relate to all chemical procedures.

### **Academic dishonesty:**

Academic dishonesty won't be tolerated. Any student suspected of academic dishonesty may be subject to disciplinary action, including the possibility of failure of the course and

dismissal from the university. “Scholastic dishonesty includes but is not limited to cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an examination for another person, any act to give unfair advantage to student or the attempt to commit such acts.” Regent’s Rules and Regulations, Part One, Chapter VI, Section 3, Subsection 3.2, Subdivision 3.22. Since scholastic dishonesty harms the individual, all students, and the integrity of the university, policies on scholastic dishonesty will be strictly enforced.

**Grading Policy:**

- There will be four exams on the material covered in class during the semester. You must take all four exams. If you take all four exams, the exam with the lowest score will be dropped and only the scores of the highest three exams will be part of your grade. If you miss an exam without a university accepted excuse you will get a zero on that exam and **NO exam will be dropped.**
- There will be four quizzes given at the beginning of the class. If you come to class after the quiz is over you can’t take the quiz and you will get a zero. If you take all four quizzes, the quiz with the lowest score will be dropped and only the scores of the highest three quizzes will be part of your grade. If you miss a quiz without a university accepted excuse you will get a zero on that quiz and **NO quiz will be dropped.**
- No make up for exams or quizzes is allowed.
- Various assignments will be given during the semester. The assignments include selected articles related to clinical chemistry. Details about the nature of the assignments will be given during the first week of classes.
- There will be a comprehensive Final Exam in all the chapters that we covered in class during the final week.

**Grade distribution among course tasks:**

**Grading Scale:**

Exams	40 %	90 - 100	A
Quizzes	20 %	80 – 89	B
Final Exam	25 %	75 - 79	C
Assignments	15 %	< 75	F

## Class Schedule (Clinical Chemistry-I)

<b>Lecture</b>	<b>Topic</b>	<b>Chapter</b>
1-2	Introduction Basic laboratory principles and techniques	Chapter 1
3-4	Spectral techniques	Chapter 4
5	Chromatography: Theory and practice	Chapter 5
6	Liquid chromatography	Chapter 6
7	Gas Chromatography	Chapter 7
8	<b>EXAM # 1</b>	
9	Mass spectrometry	Chapter 8
10	Radioisotopes in Clinical Chemistry	Chapter 9
11	Electrophoresis	Chapter 10
12	Immunochemical techniques	Chapter 12
13	Measurement of colligative properties	Chapter 14
14	Electrochemistry: principles and measurements	Chapter 15
15	<b>EXAM # 2</b>	
16	Quality control for the Clinical Chemistry laboratory	Chapter 21
17	Evaluation of methods	Chapter 22
18	Interferences in chemical analysis	Chapter 23
19-20	Physiology and pathophysiology of body water and electrolytes	Chapter 24
21-22	Acid-base control and acid-base disorders	Chapter 25
23	<b>EXAM # 3</b>	
24-25	Renal function	Chapter 26
26-27	Liver function	Chapter 27
28	<b>EXAM # 4</b>	
29	Review	