



The University of Texas at El Paso
College of Health Sciences
Clinical Laboratory Science Program



CLSC 3155: Clinical Chemistry I Laboratory
Syllabus
Fall 2022

I. Course Information

Days: Tuesday

Time: 1:00pm – 3:50pm

- Time in lab will vary!!!
- You must complete **ALL** laboratory protocols before you can leave the lab. This includes bench clean-up and disinfection.
 - Let all the significant people in your life know that there is a probability that you may be coming home late and make the necessary arrangements.

Room: College of Health Sciences (CHS) 137 – CLS Laboratory

II. Instructor Information

Instructor: Nancy D. Cruz-Sanchez, MS, MLS (ASCP)^{CM}

Email: ndcruzsanch@utep.edu

Office: College of Health Sciences (CHS) 426

Office Phone Number: 915-747-7243

Office Hours: BY APPOINTMENT

Monday and Wednesday: 1:00pm – 4:00pm

Friday: 11:00am – 2:00pm

- In order to better assist you, please make sure you **schedule an appointment**. If you can't schedule during these times, please contact me (after class/lab or via email) to schedule another time.
 - Multiple students may be scheduled for the same office hour session.
 - If it is a private matter, you wish to discuss material or have questions and prefer to have a private office hour or online session, please make sure to notify the instructor when appointment is being made.
- Online meetings may be scheduled (Zoom, Teams).
- Students must use their UTEP email when communicating, for appointments, questions, etc.
 - Emails received:
 - Monday through Thursday after 5:00pm will be replied to the next day.

- **Friday after 4:00pm will be replied Monday (or next business day if it is a holiday).**
 - **Saturday and/or Sunday will be replied Monday (or next business day if it is a holiday).**
 - **Holidays will be replied to the next business day.**
- **Instructor is also available after class/lab (unless another class is on her schedule).**
 - **If instructor is not in her office, she may be in CHS 137 Laboratory Prep Room preparing for laboratories. Students may attend office hours in prep room with instructor.**

III. Course Description

This course is designed to develop and refine laboratory skills in performing clinical chemistry testing by applying the theory and principles learned in lecture. Clinical Chemistry is a rapidly changing area in laboratory medicine because of the constant innovation and variety of analytical techniques as well as automated instrumentation development and availability. Therefore, it is essential that the basic principles as well as the techniques used in clinical chemistry be understood and mastered by the laboratorian. These include the basic theory of chemical determinations, understanding the different techniques used, use and care of laboratory equipment and instruments, quantitative measurement calculations and application, proper preparation of reagents, recognition of problems when they arise, troubleshooting performance and problem solving, proper collection and handling of specimens, reporting of results, and the use of quality control and quality assurance protocols in the performance of any procedure in the laboratory. This laboratory provides the basic skills necessary for performing clinical chemistry laboratory analyses. Several fundamental laboratory methods will be performed by the students using common clinical chemistry principles. These laboratory assays provide the basis for most clinical chemistry analyses which will be demonstrated in the clinical hospital laboratory rotations. The course includes the principles and practices of quality control, and pre-analytical, analytical and post-analytical phases of testing in the clinical chemistry laboratory. The uses and general principles of selected tests and methodologies in the clinical chemistry laboratory will be discussed, as the student performs the test. There will be additional focus on laboratory mathematics and how it is applied to obtain the results achieved.

Course co-requisite: CLSC 3354 – Clinical Chemistry I

Course pre-requisite: CHEM 1305, CHEM 1105, CHEM 1306, CHEM 1106, CHEM 2324 and CHEM 2124 (Each with a grade of “C” or higher and department approval.)

IV. Course Goal

This course intends to provide the student with clinical chemistry laboratory foundations, skills, and techniques to enable appropriate laboratory performance. The student will learn to competently perform and complete basic procedures and techniques, obtain results, and correctly interpret the findings given adequate clinical data. This course will provide the student with the knowledge to accurately distinguish between normal and

abnormal results and will aid in the evaluation and analysis of the results using patient clinical history and evidence.

V. Course Objectives

A. Cognitive

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

1. Describe basic principles, practices and differentiate between the different instrumentation used in the clinical chemistry laboratory including:
 - a. Selection of appropriate sample collection tubes and containers
 - b. Proper centrifuge loading
 - c. Selection and use of different types of pipettes (micropipettes, serological, volumetric, etc.).
 - d. Selection of appropriate micropipette tips
 - e. Proper use and handling of laboratory instrumentation (i.e., spectrophotometer).
 - f. Disposal of laboratory waste
2. Analyze laboratory safety regulations.
3. Understand and implement the usage of personal protective equipment (PPE) in the laboratory.
4. Discuss, understand, and implement universal precautions policy.
5. Understand and implement the appropriate procedures for the handling, disposal, decontamination, and spill control of biohazards and chemicals handled in the laboratory.
6. Understand the purpose of the Safety Data Sheet and the information it contains.
7. Understand and implement proper labeling for chemicals and materials used in the laboratory.
8. Understand the importance of OSHA and its standards.
 - a. Understand and describe the importance of bloodborne pathogens standard and its relevance to the profession.
9. Differentiate quality assurance from quality control.
10. Distinguish the difference between calibrators and controls.
11. Understand the different analytical techniques and instrumentation used in the clinical laboratory.
12. Analyze the importance of laboratory mathematics in the clinical laboratory.
 - a. Use Beer's Law to calculate analyte concentration.
 - b. Reagent and sample dilutions.
13. Recognize the normal ranges or reference intervals for analytes determined in the laboratory.
 - a. Utilize the normal ranges or reference values to evaluate abnormal results.
 - Evaluate the possibility of reporting the patient's results.

- Recognize any discrepancy in results.
 - Interpret results in a timely manner.
14. Assess the pre-analytical, analytical, and post-analytical factors that affect a patient's results:
- a. Determine sample integrity and factors that affect it. I.e.:
 - Collection
 - Handling
 - Storage
 - Transportation
 - b. Apply specimen rejection criteria, i.e.:
 - Hemolysis
 - Clotting
 - Lipemic
 - Icteric
 - Inappropriate collection tube/container
 - c. Recognize sources of error in methods used.
 - Recognize interfering substances for different analytes and how they affect the patient's results.
 - Recognize equipment malfunction and quality control failure.
 - d. Prioritize and differentiate between STAT and routine samples.
 - e. Understand the concept of turn-around-time (TAT), assess, and prioritize samples accordingly.
 - f. Evaluate the role of the CLS in monitoring the 3 phases of testing.
 - g. Propose strategic plans to diminish the factors that affect patient results.
15. Demonstrate and apply knowledge of quality control.
- a. Select the appropriate controls for the test to be performed.
 - b. Learn to perform and interpret the control results.
 - c. Learn to identify a problem in the quality control results.
 - d. Understand what troubleshooting is and what does it entail.
 - e. Learn to establish a troubleshooting plan.
 - f. Perform troubleshooting steps.
 - g. Analyze and record all data obtained.
16. Understand the importance of Periodic Maintenance in the laboratory
17. Correct selection and preparation of controls and reagents.
18. Proper instrument operation and calibration.
19. Describe and perform a variety of clinical chemistry procedures, interpret the results obtained, and evaluate the significance of the tests and results performed.

B. Affective

To show the appropriate responsible behaviors students will demonstrate:

1. A positive attitude by being prepared for laboratory sessions, completing assigned tasks on time, and displaying self-motivation.
2. Organization by utilizing time effectively, sequencing, and prioritizing tasks for completion with the time constraints and maintaining a neat, clean work area.
3. Adherence to safety rules by correct usage of PPE, proper disposal of materials, reagents, and specimens, and avoiding eating, drinking, and chewing gum in the laboratory.
4. Attention to detail by diligently pursuing accuracy and documenting data accurately and legibly.
5. Problem solving ability by interpretation of results, understanding the analytical technique principle and procedure in order to correct the error by repeating the procedure when necessary.
6. Follow directions and work independently after being given directions.
7. Stability and self-confidence by approaching and performing routine tasks and analytical procedures confidently without assistance and maintaining composure.
8. Appropriate interpersonal skills by cooperating and communicating effectively with classmates and instructor. Displaying courteous, considerate behavior and appropriate appearance.
9. 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

After learning experiences are introduced, the student will gradually and completely:

1. Examine specimen for proper sample integrity and apply specimen rejection criteria if necessary.
2. Perform proper and correct pipetting techniques.
3. Perform and document quality control procedures on reagents, instruments, refrigerators, incubators, and other laboratory equipment and/or instrumentation used.
4. Perform and document corrective actions to take/taken (troubleshooting) in cases where quality control fails.
5. Perform all procedures introduced in this course within the appropriate standard deviation for the procedure.
6. Perform simple dilutions using the proper techniques.
7. Perform a variety of chemical assays and procedures (i.e., enzymatic, colorimetric, saccharogenic, immunoassays, and spectrophotometry) to analyze patient sample and obtain analyte results.
8. Use the Beer-Lambert Law to calculate and obtain analyte results.

9. Observe universal precautions when handling blood and body fluid specimens.
10. Preparation of 10% bleach.
11. **Clean, disinfect and organize** the work area after each laboratory session with 10% bleach.
12. Dispose of biohazardous materials (contaminated gloves, paper towels, plastic pipettes, etc.) in the appropriate containers.
13. Dispose of clean sharps (i.e., clean but broken laboratory glassware) in the **glass only** container.
14. Dispose of contaminated sharps (i.e., bloody glassware, needles) in the **red sharps** container.
15. Dispose of clean paper towels, papers, etc., in the regular trash can.

VI. Course Policies

- A. Textbook: Bishop, Michael L., Fody, Edward P., Van Sicken, Carleen, Mistler, James M., Moy, Michelle. 2023. *Clinical Chemistry. Principles, Techniques and Correlations. 9th Edition*. Jones & Bartlett Learning.
- B. Instructional Policies
 1. Material and resources for the class will be provided using the following:
 - a. Blackboard Collaborate Ultra
 - b. YouTube
 2. Announcements, updates, notifications, and other important messages will be posted to Blackboard announcements.
 - a. It is the student's responsibility to check Blackboard on a regular basis.
 3. Students are required to read, ahead of time, handouts, laboratory exercise protocol, and other materials and/or resources provided in Blackboard.
 4. Students are required to come to the laboratory session with the **printed** material for the laboratory exercise (i.e., laboratory protocol, data/calculations/observations sheet).
- C. Quiz and Exam Policy
 1. Quizzes and Exams will be taken in the laboratory (classroom if available) in written form.
 2. Quizzes may be announced or unannounced.
 3. No make-up exams or quizzes will be given.
 4. If an exam or quiz is missed the grade will be 0. All grades will be used for calculating the final grade, no grades will be dropped.
 5. If a student cannot attend a test, quiz, midterm, or final exam for a **university-acceptable excuse**, inform the instructor as soon as possible and a time will be arranged accordingly with the instructor's schedule. It is the responsibility of the student to notify the instructor of any absence and to provide legitimate documentation of absence as per university regulations.

6. The instructor will assign each student a seat for the examination.
7. All personal belongings including laboratory material, documents, etc. must be kept in the designated area for personal belongings or in the bench drawers (lab material).
8. If a calculator is needed for the exam, the instructor will let you know ahead of time. Calculator lids must be kept with your personal belongings. The instructor will check the calculators (especially if a scientific or graphic calculator is being used).

D. Assignment / Lab Report Policy

1. Students are required to submit/hand in assignments (laboratory reports) in a timely manner and in the appropriate designated folder or Blackboard folder.
 - a. Deadlines will be announced previously as assignments are programmed and requested on each laboratory session.
 - b. Failure to hand in (submit)/complete an assignment in a timely manner will lead to a 2-point deduction each day the assignment is late (includes weekends and holidays).
 - If a legitimate reason/excuse (death, illness, etc.) prevents the student from handing the assignment on the due date, inform the instructor as soon as possible, bring the necessary documentation and considerations may be made, depending on situations, on an individual basis.
 - **NO** make-up assignments will be offered.
 - c. Assignments/laboratory reports are to be submitted/handed in **neatly** and in ink or typed. They must also be properly identified (name, date).
 - d. Laboratory reports must contain **ALL** laboratory data, calculations, significant figures, results, and units properly identified and presented. If graphs are required, they must contain proper axis identification, title, units, data, and data identification (legend).

E. Attendance and Participation Policies

1. The student is expected to attend **ALL** laboratory sessions in a **timely fashion**.
2. The student is expected to actively participate in each laboratory session.
3. The student is expected to access Blackboard regularly for material availability, announcements, etc.
4. The student should spend 2-3 hours a week studying the material and resources provided by the instructor and textbook.
5. Absences: After 2 absences you will be given a written warning. If absent 3 times, you may be dropped from the course.
6. Tardiness: Students arriving after 10 minutes will be considered tardy (points will be deducted).
7. It is responsibility of the student to notify the instructor of any absence and to provide legitimate documentation of absence as per university regulations.
8. The instructor reserves the right to drop a student due to tardiness or absenteeism, when, in the judgment of the instructor, a student has been

absent to a degree as to impair his or her status relative to credit for the course. The instructor may drop the student from the class with a “W” before the course drop deadline or an “F” after the course drop deadline.

a. October 28, 2022

9. In case of being absent to a laboratory session, **NO MAKE-UP LABS WILL BE AVAILABLE. NO EXCEPTIONS.** The student is responsible for the material discussed in class as well as announcements made in class.
10. The student is expected to participate in office hours.
 - a. Multiple students may be scheduled for the same office hour session.
 - b. If it is a private matter or you wish to discuss material or have questions and prefer to have a private office hour or online session, please make sure to notify the instructor when appointment is being made.

F. Laboratory Policies

1. The student will present to the laboratory session wearing the appropriate clothing, i.e.,
 - a. Scrubs
 - CLS Junior Scrubs
 - b. If the student will not be wearing scrubs, the student must dress **appropriately** for a laboratory:
 - Long jeans/pants/skirts (**NO** leggings)
 - Appropriate shirt with sleeves (**NO** cleavage, tank tops, halter tops, see through, crop tops)
 - c. Closed shoes (sneakers, boots, crocs (no holes)) (**NO** sandals or open toed shoes allowed).
 - **Shoes must be made of non-porous materials and meet OSHA requirements. CANVAS OR WEBBED MATERIALS ARE NOT ACCEPTABLE.**
 - d. Hair must be tied back (i.e., ponytail, bun, braid).
 - e. **NO** charm bracelets, long earrings, long necklaces permitted.
2. Personal protective equipment (PPE)
 - a. The student ***must*** wear the appropriate personal protective equipment at ***ALL TIMES*** in the laboratory (gloves, lab coat, face shield, etc.)
 - b. **NO** student will be allowed in the laboratory without the appropriate PPE.
3. **NO eating, drinking, chewing gum or smoking in the laboratory.**
4. Personal belongings have a designated area. **NO** personal belongings will be permitted in the laboratory with the exception of pencils, pens, sharpies, handouts, books, and calculators.

5. Cell phone usage is **NOT** permitted in the laboratory.
 - a. Exceptions can be made in case of emergency. **Speak with the instructor beforehand.**
 - b. Phone **MUST** remain in silent mode with personal belongings in designated area.

6. Masks are not mandated for students, faculty, or staff in the laboratory or at UTEP (per UTEP policies). However, if the student prefers to wear a mask, he/she can.
 - a. **This policy is subject to change depending on public health circumstances and UTEP policy change regarding this matter.**

7. COVID-19 PRECAUTION STATEMENT
 - a. Please stay home if you have been diagnosed with COVID-19 or are experiencing COVID-19 symptoms. If you are feeling unwell, please let me know as soon as possible, so that we can work on appropriate accommodations. If you have tested positive for COVID-19, you are encouraged to report your results to covidaction@utep.edu, so that the Dean of Students Office can provide you with support and help with communication with your professors. The Student Health Center is equipped to provide COVID-19 testing.
 - b. The Center for Disease Control and Prevention recommends that people in areas of substantial or high COVID-19 transmission wear face masks when indoors in groups of people. The best way that Miners can take care of Miners is to get the vaccine. If you still need the vaccine, it is widely available in the El Paso area, and will be available at no charge on campus during the first week of classes. For more information about the current rates, testing, and vaccinations, please visit epstrong.org.

G. Etiquette guidelines

1. Treat instructor and classmates with respect.
2. Address instructor and classmates properly and accordingly.
3. Use clear and appropriate language.
4. Vulgar/obscene language, discrimination because of race, color, ethnicity, gender, political or religious views, and inappropriate conduct is **prohibited** in class/lab.
5. The instructor reserves the right to ban the student from the laboratory if vulgar language is being used if student is being disrespectful toward the instructor or classmates or exhibiting inappropriate conduct. This will be considered an absence, and no-make-up laboratories will be administered. The student will be reported to the CLS program director.

H. Academic Integrity

There is a **zero-tolerance level** for academic dishonesty. Honesty and integrity are a critical aspect of your chosen profession, as well as patient confidentiality. Any

student who commits an act of scholastic dishonesty is subject to discipline. Scholastic dishonesty includes, but it's not limited to:

1. Cheating

This means:

- a. Copying from the homework, in-class work or exam paper of another student.
- b. Engaging in written, oral, or any other means of communication with another student during an exam or homework assignment or giving aid to or seeking aid from another student during a test.
- c. Possession and/or use of test material (class notes, books, reviews, outlines, or any other material) not authorized by the instructor or exam proctor during an exam or quiz.
- d. Using, obtaining, or attempting to obtain, by any means, a part of the whole test, test key, homework solution, computer program, and tests administered during past semesters.
- e. Substituting for another person or another person substituting oneself to take a test/quiz.
- f. Falsifying data, laboratory reports and/or other records or academic work offered for credit.

2. Plagiarism

This means:

- a. The appropriation, buying, receiving as a gift, or obtaining by any means another's work, ideas, processes, results, or words without giving appropriate credit. This includes intentionally, knowingly or carelessly, presenting the work of another as one's own; failing to credit sources used in a work product; attempting to receive credit for work performed by another; failing to cite the World Wide Web, databases and other electronic resources.
- b. The submission for credit of any work or material that is attributable (whole or in part) to another person (i.e., copying from another student).

3. Collusion

This means the unauthorized (secret or illegal) collaboration with another person in preparing academic assignments offered for credit or collaboration with another person to commit a violation of any provision of the rules on scholastic dishonesty.

Proven violations of the detailed regulations, as printed in the *Handbook of Operating Procedures (HOP)* (available in the Office of the Dean of Students), may result in sanctions ranging from disciplinary probation, failing grades on the work in question, failing grade in the course, suspension or dismissal, among others.

I. Student Support

In case of needed assistance:

1. Helpdesk
 - a. <https://www.utep.edu/irp/technologysupport/>
2. Miner Learning Center
 - a. <https://www.utep.edu/mlc/>
3. University Library
 - a. <https://www.utep.edu/library/>
4. Counseling and Psychological Services
 - a. <https://www.utep.edu/student-affairs/counsel/>
5. Student Support Services Program
 - a. <https://www.utep.edu/student-affairs/student-support-services-program/>

J. Classroom Accommodations

If you have a disability and need classroom accommodations, please contact The Center for Accommodations and Support Services (CASS) at 747-5148, by email to cass@utep.edu, or visit their office located in UTEP Union East, Room 106. For additional information, please visit the CASS website at www.sa.utep.edu/cass.

VII. Grading Policy

Evaluation Technique	%
Assignments	25%
Quizzes (Scheduled and Unscheduled)	20%
Written Mid Term Exam	25%
Final Exam	30%
Total	100%
Grading Scale	Grade
90-100	A
80-89	B
75-79	C
70-74.9*	D*
69 or below*	F*
* A grade of 75 or above is required to continue in the CLS program	
100%	

VIII. Laboratory Schedule*

Week	Date	Laboratory Session*
1	August 23	Intro, Syllabus, Evaluations (Lab Reports, Exams, etc.) Chapter 2: Laboratory Safety and Regulations Specimen Collection and Processing
2	August 30	Chapter 3: Quality Management in the Clinical Laboratory Quality Control
3	September 6	Chapter 4: Analytic Techniques Lab #1: Chromatography – Size Exclusion Chromatography
4	September 13	Lab #2: Serum (Plasma) Proteins
5	September 20	Lab #3: NPN Compounds
6	September 27	Lab #4: Enzymes: Forensic Enzymology
7	October 4	Midterm
8	October 11	Lab #5: Carbohydrates: Glucose
9	October 18	Lab #6: Diabetes Diagnosis
10	October 25	Lab #7: Glycosylated Hemoglobin
11	November 1	Lab #8: Lipids and Lipoproteins
12	November 8	Lab #9: Therapeutic Drug Monitoring and Toxicology
13	November 15	Lab #10: Hgb Electrophoresis (TBD)
14	November 22	Final Exam Review
15	November 29	Final Exam

*Schedule subject to change