

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

**CLSC 2212: Clinical Laboratory Statistics
Mathematics for the Clinical Laboratory**

Spring 2023 Syllabus

I. Course Information

Days: Monday

Time: 14:00 – 16:50

Room: CHS 135

Textbook: Doucette, Lorraine J., 2016. *Mathematics for the Clinical Laboratory*. 3rd Edition. Evolve Elsevier.

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**

Available:

Monday: 10:00 – 13:30

Tuesday: 10:00 – 11:30

Wednesday: 10:00 – 13:30

Thursday: 10:00 – 11:30 / 13:30- 16:00

Friday: 10:00 – 12:00

- In order to better assist you, please make sure you **schedule an appointment**. If you can't schedule during these times, please contact instructor (after class/lab or via email) to schedule another time.
 - o Multiple students may be scheduled for the same office hour session.
 - o 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.
 - o 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 Monday is a holiday).
 - Saturday and/or Sunday will be replied Monday (or next business day if Monday 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 the instructor is not in her office during office hours, she may be in CHS 137 Laboratory Prep Room preparing for laboratories. Students may attend office hours in the prep room with the instructor.

III. Course Description

This course will focus on mathematical topics, computations and methods most often used in clinical and medical laboratories, with special emphasis on the clinical calculations used in each of the areas of the laboratory to ensure accurate patient results. Specific topics will include basic mathematical principles and systems of measurement, dilutions, solutions, ionic strength, calculations for specific areas of the clinical laboratory, and statistical calculations used to measure and maintain quality control. Application problems and hands-on laboratory exercises will help reinforce the material presented in the course and give the students the opportunity to assess their mastery of the various mathematical topics discussed.

IV. Course Goal

This course intends to provide the student with an understanding of the basic mathematical principles and calculations used in clinical laboratory testing as well as those associated with quality assurance, quality control and method comparison. Students will develop analytical thinking and problem-solving skills to be able to identify, troubleshoot and discuss laboratory calculations and findings.

V. Course Objectives

A. Cognitive

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

1. State the rules and perform mathematical calculations using and involving scientific notation.
2. Describe units of measure commonly used in the clinical laboratory in terms of their relationship to the applicable system of measure and the relationship of the unit to the system: i.e., measurement of length, weight, mass, and temperature.
3. Recognize and describe the major types of solutions.
4. Calculate and determine all components related to dilutions, titers, concentrations, and volumes.

5. Define molarity, normality, mole, molar, molality, equivalent weight, and be able to calculate their concentrations in solutions.
6. Describe quality assurance and quality control in the clinical laboratory.
7. Define and calculate various parameters used in QA/QC assessment.
8. Plot QC results on a Levey-Jennings chart and evaluate the acceptability of results using Westgard rules.
9. Compare and contrast systemic and random errors.
10. Apply mathematical calculations to specific clinical areas in the laboratory, i.e., Chemistry, Hematology, Urinalysis, Immunohematology, and Microbiology.

B. Affective

Upon completion of this course, the student will be able to exhibit the appropriate responsible behaviors by demonstrating:

To show the appropriate responsible behaviors students will demonstrate:

1. Educational initiative and a positive attitude by being prepared for 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.
3. Adaptability and flexibility to change and learning.
4. Good judgement and exercise emotional intelligence by accepting personal responsibility for consequences of one's own actions.
5. Attention to detail by diligently pursuing accuracy and documenting data accurately and legibly.
6. Dependability by following directions and working independently after being given directions.
7. Maturity, stability, and self-confidence by approaching and performing routine and stressful tasks confidently without assistance and maintaining composure, and by defining and being aware of personal limitations, seeking help when needed and pursuing continuing education independently.
8. Appropriate interpersonal skills by cooperating and communicating effectively with classmates and instructor(s) (faculty). Displaying courteous, considerate behavior and appropriate appearance.
9. Application of ethical behavior, integrity, and professionalism 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 CLS Program and the institution.
10. Commitment to organizational and professional policies regarding appearance, safety, confidentiality, and ethics by following UTEP's CLS Program Standards.

VI. Course Policies

A. Textbook: Doucette, Lorraine J., 2016. *Mathematics for the Clinical Laboratory, 3rd Edition*. Evolve Elsevier.

B. Instructional Policies

1. Material and resources for the class will be provided using the following:
 - a. Classroom lectures
 - Power Point
 - PDF
 - b. Blackboard / Blackboard Ultra
 - c. You Tube
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 may be divided into groups randomly for different learning activities like reviews, etc.
 - a. Study groups are meant to be help and support for all students through the semester.
 - b. All members ***must*** participate in class discussion.
4. The instructor can help students create their own study guides/outlines and may upload to Blackboard outlines/study guides for each chapter/lecture when instructor understands they are necessary.
 - a. Students are ***strongly encouraged*** to (should) create/complete outlines/study guides and study (prepare) ***before*** coming to class.
 - b. Outlines/study guides may be discussed in class by students and guided by instructor.
 - c. Outline/study guide completion is strongly encouraged to be done with study group.
 - All members ***must*** participate in outline/study guide discussion in class.
5. Students are encouraged to (should) read material ahead of time (when available).
6. The student must have available or have access to the following technological resources:
 - a. Computer/laptop with camera (webcam), audio and microphone.
 - b. USB flash drive
 - c. Good internet connection
 - d. Microsoft Office (Word, Power Point, Excel)

- e. Adode (PDF) Flashplayer
- f. Windows Media Player
- g. Internet browser (i.e., Google Chrome, Mozilla Firefox, Safari)
- h. Blackboard's Respondus LockDown Browser

7. LockDown Browser + Webcam Requirement

- a. This course requires the use of LockDown Browser and a webcam for online quizzes and exams. The webcam can be the type that's built into your computer or one that plugs in with a USB cable. Watch this brief video to get a basic understanding of LockDown Browser and the webcam feature.
 - <https://www.respondus.com/products/lockdown-browser/student-movie.shtml>
- b. Download Instructions
 - Download and install LockDown Browser from this link:<https://download.respondus.com/lockdown/download.php?id=586140509>
 - Once Installed:
 - ◊ Start LockDown Browser
 - ◊ Log into Blackboard Learn
 - ◊ Navigate to the test
 - ◊ Note: You won't be able to access tests with a standard web browser. If this is tried, an error message will indicate that the test requires the use of LockDown Browser. Simply start LockDown Browser and navigate back to the exam to continue.
- c. Guidelines
 - When taking an online test, follow these guidelines:
 - ◊ Ensure you're in a location where you won't be interrupted
 - ◊ Turn off all other devices (e.g. tablets, phones, second computers) and place them outside of your reach
 - ◊ Before starting the test, know how much time is available for it, and also that you've allotted sufficient time to complete it
 - ◊ Clear your desk or workspace of all external materials not permitted - books, papers, other devices
 - ◊ Remain at your computer for the duration of the test

- ◊ If the computer, Wi-Fi, or location is different than what was used previously with the "Webcam Check" and "System & Network Check" in LockDown Browser, run the checks again prior to the exam
 - ◊ To produce a good webcam video, do the following:
 - i. Avoid wearing baseball caps or hats with brims
 - ii. Ensure your computer or device is on a firm surface (a desk or table). Do NOT have the computer on your lap, a bed, or other surface where the device (or you) are likely to move
 - iii. If using a built-in webcam, avoid readjusting the tilt of the screen after the webcam setup is complete
 - iv. Take the exam in a well-lit room but avoid backlighting (such as sitting with your back to a window).
- d. Remember that LockDown Browser will prevent you from accessing other websites or applications; you will be unable to exit the test until all questions are completed and submitted.
- e. Getting Help
 - Several resources are available if you encounter problems with LockDown Browser:
 - The Windows and Mac versions of LockDown Browser have a "Help Center" button located on the toolbar. Use the "System & Network Check" to troubleshoot issues. If an exam requires you to use a webcam, also run the "Webcam Check" from this area.
 - As applicable, insert information about your institution's help desk, including details about how to contact them. Some help desks want students to run the "System & Network Check" and the "Webcam Check" before they are contacted - and even, to forward the results of these checks at the time of opening a ticket.
 - Respondus has a Knowledge Base available from support.respondus.com. Select the "Knowledge Base" link and then select "Respondus LockDown Browser" as the product. If your problem is with a webcam, select "Respondus Monitor" as your product.
 - If you're still unable to resolve a technical issue with LockDown Browser, go to support.respondus.com and

select "Submit a Ticket". Provide detailed information about your problem and what steps you took to resolve it.

C. Assignment Policy

1. Assignments will be announced and assigned 1 to 2 weeks before the deadline.
2. Students are required to hand in assignments in a timely manner.
 - a. Deadlines will be announced previously as assignments are prepared and programmed throughout the semester.
 - b. **Late submission: Assignments will have a 2-point deduction each day the assignment is late (includes weekends and holidays), up to 1 week.**
 - c. **Assignments will not be accepted after the 1 week of tardiness and the assignment grade will be 0.**
 - Individual assignments: 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.
 - Group assignments: Each group member is responsible on making sure their assignment was submitted.
 - **NO** make-up assignments will be offered.
 - **It is suggested that the student submit the assignment before the due date.**
 - d. Assignments are to be submitted **neatly as a PDF file, via Blackboard**, in the available corresponding folder. Assignments will **NOT** be accepted in any other format or if sent by email.
 - Make sure your report was uploaded correctly.
 - If there is any issue uploading the report to Blackboard, communicate the issue to the instructor.
 - e. **Assignments should be submitted with ALL calculations performed and corresponding data and units. Failure to do so will result in point deduction according to the exercise values.**
 - f. Assignments are to be properly identified (name, date).
 - g. Assignments can also be prepared as a Blackboard/Respondus assignment → multiple choice.

D. Quiz and Exam Policy

1. Quizzes and Exams will be taken **in the classroom** using Blackboard Respondus LockDown Browser + Webcam.
2. **Quizzes may be announced or unannounced.**

3. No make-up exams or quizzes will be administered.
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, or final exam for a **university-acceptable excuse**, inform the instructor as soon as possible and the 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.
 - a. Legitimate documentation needs to be provided at the time of exam/quiz rescheduling.
 - b. The re-scheduled exam/quiz will be administered on campus.
 - Instructor's office or separate reserved room close to instructor's office.
6. The instructor will assign each student a seat for the examination.
7. All personal belongings including material, documents, books, etc. must be kept in the designated area assigned by the instructor.
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).

E. Attendance and Participation Policies

1. The student is expected to attend ***all*** lecture sessions in a **timely fashion**.
2. The student is expected to participate during class sessions.
3. The student is expected to access Blackboard regularly for material availability, announcements, etc.
4. The student should spend 4-6 hours a week studying the material and resources provided by the instructor and textbook.
5. Absences: After 3 absences you will be given a written warning. If absent 4 times, you may be dropped from the course.
6. Tardiness: Students arriving after 10 minutes will be considered tardy.
7. It is the responsibility of the student to notify the instructor of any absence or tardiness, and to provide legitimate documentation of absence as per university regulations.
 - a. The student is responsible for the material discussed in class as well as announcements made in class.
8. The instructor reserves the right to drop a student due to tardiness or absenteeism, when, in the judgement of the instructor, a student has been absent to a degree as to impair their 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. **Course Drop Deadline: March 30, 2023.**

9. 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 an appointment is being made.

F. Classroom Policies

1. The student will present to the classroom wearing appropriate clothing, i.e.:
 - a. No cleavage, see-through or short (crop tops) shirts or tops.
 - b. No short shorts, short skirts, hot pants, or leggings.
2. Cell phone usage is **NOT** permitted in the classroom.
 - a. Exceptions can be made in case of an emergency. **Please talk to the instructor beforehand.**
 - b. Phone **MUST** remain in silent mode inside your backpack, purse, pocket, etc.
3. Headphones, earphones, air pods, ear plugs, or any of these personal devices are **NOT** permitted in class or during exams or quizzes.
 - a. If a student requires a quiet testing environment, the student needs to go to CASS. CASS will communicate with the instructor if the special accommodation is approved and make arrangements with the instructor for the special accommodation.
4. Video or audio recordings are **NOT** permitted in class.
 - a. If a student requires recordings of the lectures due to a disability, the student needs to go to CASS. CASS will communicate with the instructor if the special accommodation is approved and make the arrangements for the special accommodation.
 - b. If a student that is not covered under CASS special accommodations is caught recording, the instructor will ask the student to stop and erase the recording.
 - If this practice continues in the same lecture or future days, the student will be asked to leave the classroom and may be reported to the director of the program and/or Student Affairs.

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

6. COVID-19 PRECAUTION STATEMENT
 - a. Please stay home if you have been diagnosed with COVID-19 or are experiencing COVID-19 symptoms.
 - b. If you are feeling unwell, please let the instructor know as soon as possible, so that appropriate accommodation can be made.
 - c. 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.
 - d. 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 for race, color, ethnicity, gender, political or religious views, and inappropriate conduct is ***prohibited*** in class.
5. The instructor reserves the right to ban the student from the classroom 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. The student will be reported to the CLS program director, Student Affairs and OSCCR.
 - a. If behavior exhibits sexual misconduct, the student will also be reported to Title IX.

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 is 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 one's self 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.

- I. Other prohibited conduct:
 1. Health or Safety
 - a. Any student who engages in conduct that endangers the health or safety of any person may be subject to discipline.
 2. Disruptions
 - a. Any student who, acting singly or in concert with others, obstructs, disrupts, or interferes with any teaching, educational, research, administrative, disciplinary, public service, or other activity or public performance authorized to be held or conducted on campus or on property or in a building or facility owned or controlled by the U. T. System or institution is subject to discipline. Obstruction or disruption includes but is not limited to any act that interrupts, modifies, or damages utility service or equipment, communication service or equipment, university computers, computer programs, computer records or computer networks accessible through the university's computer resources.
 3. Harassment
 - a. Any student who engages in harassment of a University community member, as defined under Section II-Chapter 2, Section 2.2.4, is subject to discipline.
 4. Retaliation
 - a. Any student who retaliates in any way against an individual who has brought a complaint under this Policy (or other University policy) or participated in an investigation or disciplinary process of such complaint.
 5. Unauthorized Use of Property
 - a. Any student who engages in the unauthorized use of property, equipment, supplies, buildings, or facilities owned or controlled by the U. T. System or institution is subject to discipline.
 6. Vandalism
 - a. Any student who defaces, mutilates, destroys, or takes unauthorized possession of any property, equipment, supplies, buildings, or facilities owned or controlled by an institution or the U. T. System is subject to discipline.
 7. Use of Explosives, Weapons or Hazardous Chemicals
 - a. Unless authorized by federal, state, or local laws, a student who possesses or uses any type of explosive, firearm, imitation

firearm, ammunition, hazardous chemical, or weapon as defined by state or federal law, while on campus or on any property or in any building or facility owned or controlled by the U. T. System or institution, is subject to discipline. The University has a Campus Carry Policy and any violation of that Policy by a student will be handled according to the procedures in this Policy unless that Policy explicitly states otherwise.

8. Theft

- a. Any student who commits theft, steals, or takes unauthorized possession of any personal property of any community member or University property within the buildings or facilities owned or controlled by the University or the U.T. System is subject to discipline.

9. Sale or Use of Alcoholic Beverages

- a. The University enforces all state and federal laws or regulations which regulate and control the sale or use of alcohol on campus, including those pertaining to the possession of alcohol by minors. University regulations prohibit the possession and/or consumption of alcoholic beverages on university property without prior written authorization by appropriate administrative officials. Customers of legal age under state law may purchase and consume alcoholic beverages in areas on the campus specifically designated for the public sale and consumption of beer and wine, and residents of University Housing are authorized to possess and consume beer and wine in the privacy of their living quarters, if they are of legal age under state law.
- b. The University, however, in accordance with the Texas Alcoholic Beverage Commission's amnesty policy, affords amnesty to a minor seeking aid in a medical emergency if the minor (1) requested emergency medical assistance in response to the possible alcohol overdose of the minor or another person; (2) was the first person to make a request for medical assistance under Subdivision (1); and (3) if the minor requested emergency medical assistance for the possible alcohol overdose of another person: (A) remained on the scene until the medical assistance arrived; and (B) cooperated with medical assistance and law enforcement personnel, if applicable.

10. Drugs

- a. Any student who is found responsible for the illegal use, possession and/or sale of a drug or narcotic is subject to discipline.

Students practicing any of these behaviors will be reported to the program director, Student Affairs, and OSCCR. Students participating in sexual misconduct/harassment behavior will also be reported to Title IX, in addition to the offices mentioned previously.

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.

J. 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/>

K. Classroom Accommodations

If you have a disability and need special 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.

L. University Counseling Center

If you have personal issues and feel like you need assistance, the university offers counseling services and resources. They are available online and in person through the Division of Student Affairs. You can access these services:

1. Online: <https://www.utep.edu/student-affairs/counsel/index.html>
2. By phone: 915-747-5302

3. Email: caps@utep.edu
4. In Person: Counseling Center
202 Union West
El Paso, Texas 79968

VII. Grading Policy

Evaluation Technique	%
Assignments	10%
Quizzes	10%
5 Partial Exams	12% each (60% total)
Final	20%
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 for admission to the CLS program.	

VIII. Spring 2023 Lecture Schedule*

Week	Date	Topic/Chapter
1	January 23	Introduction/Syllabus Discussion Chapter 1: Basic Arithmetic, Rounding Numbers and Significant Figures
2	January 30	Chapter 2: Scientific Notation, Exponents and Logarithms Chapter 3: Systems of Measurements
3	February 6	Exam #1: Chapters 1-3 (1 hour and 30 minutes) Chapter 4: Dilutions and Titers
4	February 13	Chapter 5: Calculations Associated with Solutions
5	February 20	Exam Review
6	February 27	Exam #2: Chapters 4 & 5 (1 hour and 30 minutes) Chapter 6: Clinical Chemistry Laboratory
7	March 6	Chapter 7: Urinalysis Laboratory Exam Review
8	March 13	<i>Spring Break</i> 🌟
9	March 20	Exam #3: Chapters 6 & 7 (1 hour and 30 minutes) Chapter 8: Hematology Laboratory
10	March 27	Chapter 9: Immunohematology Laboratory Chapter 10: Microbiology Laboratory
11	April 3	Exam #4: Chapters 8-10 (1 hour and 30 minutes) Chapter 12: Quality Assurance in the Clinical Laboratory: Basic Statistical Concepts
12	April 10	Chapter 13: Quality Assurance and Quality Control in the Clinical Laboratory
13	April 17	Chapter 14: Comprehensive Laboratory Quality Assurance
14	April 24	Exam Review
15	May 1	Exam #5: Chapters 12-14
16	May ____	Final Exam: TBD

***Schedule subject to change**