MLAB 1201 - Introduction to Clinical Laboratory Science
MLAB 1201.401 Course Syllabus

State Approval Code 51.1004
Instructor Name Antiquene Nichols
Semester/Year Fall 2025

Meeting Time and Location
Online—students are expected to spend at least 3-4 hours per week** reading, reviewing, and participating in assigned activities for successful completion of this course.

Alternate Operations During Campus Closure
In the event of an emergency or announced campus closure due to a natural disaster or pandemic, it may be necessary for Panola College to move to altered operations. During this time, Panola College may opt to continue delivery of instruction through methods that include, but are not limited to: online learning management system (CANVAS), online conferencing, email messaging, and/or an alternate schedule. It is the responsibility of the student to monitor Panola College's website (www.panola.edu) for instructions about continuing courses remotely, CANVAS for each class for course-specific communication, and Panola College email for important general information.

Student Basic Needs
Unexpected circumstances may arise, but Panola College offers various resources to support students. If you need mental health services or are facing challenges with transportation, affording class materials and supplies, or accessing food regularly—issues that may impact your class performance—please visit panola.edu/resources.

Class Attendance
Regular and punctual attendance of classes and laboratories is required of all students. When a student has been ill or absent from class for approved extracurricular activities, he or she should be allowed, as far as possible, to make up for the missed work. If a student has not actively participated by the census date, they will be dropped by the instructor for non-attendance. This policy applies to courses that are in-person, online, hybrid, and hyflex.

Attendance in online courses is determined by submission of an assignment or participation in an activity. According to federal guidelines, simply logging into a distance learning course without participating in an academic assignment does not constitute attendance. Distance learning is defined as when a majority (more than 50%) of instruction occurs when the instructor and students are in separate physical locations. Students must engage in an academic activity prior to the course census date.

When an instructor feels that a student has been absent to such a degree as to invalidate the learning experience, the instructor may recommend to the Vice President of Instruction that the student be withdrawn from the course. Instructors may seek to withdraw students for non-attendance after they have accumulated the following number of absences:

Fall or spring semesters:

3 or more class meeting times per week - 5 absences

2 class meeting times per week - 3 absences

1 class meeting per week - 2 absences

The student is responsible for seeing that he or she has been officially withdrawn from a class. A student who stops attendance in a class without officially withdrawing from that class will be given a failing grade; consequently, the student must follow official withdrawal procedures in the Admissions/Records Office.

Please note: Health Science and Cosmetology courses may require more stringent attendance policies based on their accreditation agencies. Please see the addendum and/or program handbook for further information concerning attendance.

Pregnant/Parenting Policy

Panola College welcomes pregnant and parenting students as a part of the student body. This institution is committed to providing support and adaptations for a successful educational experience for pregnant and parenting students. Students experiencing a need for accommodations related to pregnancy or parenting will find a Pregnancy and Parenting Accommodations Request form in the Student Handbook or may request the form from the course instructor.

Artificial Intelligence (AI) Course Policy

Broader use of Generative AI permitted within the course.

The use of artificial intelligence (AI) tools, including ChatGPT, is permitted in this course for students who wish to use it. Students must cite AI-generated material that informs their work. Using an AI tool to generate content without proper attribution qualifies as academic dishonesty.

Instructional Goals and Purposes

The purpose of this course is to introduce the student to the field of clinical laboratory science. This course is an overview of the field of Medical Laboratory Technology (MLT).

Learning Outcomes

1. Perform laboratory math.
2. Identify laboratory equipment.
3. Describe quality control, safety, accreditation, certification, professionalism, and ethics.

Specific Course Objectives (includes SCANS)

After studying all materials and resources presented in the course, the student will be able to:

1. **Chapter 1 (1a-i, ii, iv, v. 1b-ii, iii, iv, v, vi. 2a-iii. 2c-i, ii, iii, iv. 2d-i, ii.)**
    a. Explain the role of the clinical laboratory in the delivery of healthcare.
    b. Differentiate the classification of laboratory testing by complexity of the test: waived, moderately complex, highly complex, and provider-performed microscopy based on CLIA'88 regulations.
    c. Define the acronyms and explain the purpose of OSHA, CLIA'88, CMS, TJC, and CAP.
    d. Name the typical departments of a clinical laboratory and briefly describe the functions of each department.
2. **Chapter 2 (1a-i, ii, iv, v. 1b-ii, iii, iv, v, vi. 2a-iii. 2c-i, ii, iii, iv. 2d-i, ii.)**
    a. Analyze the six goals for healthcare delivery and provide examples the important issues in each goal category.
    b. Name three general causes of accidents in a clinical laboratory.
    c. Contrast the basic aspects of infection control policies, including how and when to use personal protective equipment or devices (e.g., gowns, gloves, goggles) and evaluate the reasons for using Standard Precautions.
    d. Explain successful implementation of chemical hazards "right-to-know" rules.
3. **Chapter 3 (1a-i, ii, iv, v. 1b-ii, iii, iv, v, vi. 2a-iii. 2c-i, ii, iii, iv. 2d-i, ii.)**
    a. Explain the purpose of clinical laboratory testing.
    b. Describe the purpose of the CLIA '88 quality control requirements and the categories of testing that are regulated.
    c. Describe the importance of quality assessment.
    d. Give at least two examples in each of the phases of testing: pre-analytical, analytical, and post-analytical.
    e. Evaluate Levy-Jennings charts and Westgard rules for monitoring quality control.

4. **Chapter 5 (1a-i, ii, iv, v. 1b-ii, iii, iv, v, vi. 2a-iii. 2c-i, ii, iii, iv. 2d-i, ii.)**
    a. Define the terms, numerical aperture and resolution.
    b. Compare the magnification strength and applications of low-power, high-power and oil immersion lens.
    c. Identify the parts of the microscope.
    d. Name and explain the components of the illuminating and magnification systems of a microscope.
5. **Chapter 6 (1a-i, ii, iv, v. 1b-ii, iii, iv, v, vi. 2a-iii. 2c-i, ii, iii, iv. 2d-i, ii.)**
    a. Calculate temperatures from degrees Fahrenheit to degrees Celsius.
    b. Explain how laboratory volumetric glassware is calibrated, how the calibration markings are indicated on the glassware, and proper cleaning protocol.
    c. Evaluate the advantages and use of micropipettes, volumetric pipettes, and serologic pipettes.
    d. Discuss the operation and uses of common laboratory balances.
6. **Chapter 7 (1a-i, ii, iv, v. 1b-ii, iii, iv, v, vi. 2a-iii. 2c-i, ii, iii, iv. 2d-i, ii.)**
    a. Define the terms density and specific gravity.
    b. Compare the expressions of solution concentration, weight per unit weight and weight per unit volume.
    c. Calculate proportions, ratios, and the amount of one solution needed to make a solution of a lesser concentration.
    d. Describe the procedures for making a single dilution and a serial dilution.
7. **Chapter 8 (1a-i, ii, iv, v. 1b-ii, iii, iv, v, vi. 2a-iii. 2c-i, ii, iii, iv. 2d-i, ii.)**
    a. Define Beer's law.
    b. Summarize the criteria for the preparation and use of a standard curve.
    c. Name the components and describe the functions of a spectrophotometer.
    d. Explain the principle of flow (cell) cytometry and its clinical application.
    e. Describe the characteristics of enzyme immunoassay.
8. **Chapter 9 (1a-i, ii, iv, v. 1b-ii, iii, iv, v, vi. 2a-iii. 2c-i, ii, iii, iv. 2d-i, ii.)**
    a. Compare the major advantages and disadvantages of point-of-care testing (POCT).
    b. Identify the four categories of Clinical Laboratory Improvement Amendments (CLIA) test procedures.
    c. Discuss non-instrument-based testing methods (e.g., pregnancy, fecal occult blood).
    d. Describe overall product and functions of laboratory information systems.
9. **Chapter 10 (1a-i, ii, iv, v. 1b-ii, iii, iv, v, vi. 2a-iii. 2c-i, ii, iii, iv. 2d-i, ii.)**
    a. Differentiate different aspects of the normal physiology of glucose metabolism including glycogenesis, gluconeogenesis, lipogenesis, and glycolysis.
    b. Compare and contrast the pathophysiology of types 1 and 2 diabetes.
    c. Compare point-of-care testing to traditional testing methods for glucose.
    d. Describe the methods for qualitative and semiquantitative determination of glucose.
    e. Explain the significance of glycosylated hemoglobin in the management of diabetes.
10. **Chapter 11 (1a-i, ii, iv, v. 1b-ii, iii, iv, v, vi. 2a-iii. 2c-i, ii, iii, iv. 2d-i, ii.)**
    a. Assess at least three types of unsuitable blood specimens and the effect of each on test results.
    b. Describe the principle of the microhematocrit determination.
    c. Describe the procedure for counting and calculating erythrocytes, leukocytes, and platelets.
    d. Describe the staining and examination of normal blood cells in a peripheral blood smear.
    e. Identify and describe the morphologic alterations of size, shape, color, inclusions, and abnormal distribution patterns in erythrocytes.
11. **Chapter 12 (1a-i, ii, iv, v. 1b-ii, iii, iv, v, vi. 2a-iii. 2c-i, ii, iii, iv. 2d-i, ii.)**
    a. Explain the role of platelets in hemostasis and associated disorders.
    b. List and describe the role of the various coagulation factors.
    c. Break down the steps in the activity of the extrinsic and intrinsic pathway of coagulation.
    d. Differentiate the three major steps of the mechanism of coagulation.
    e. Describe the process of fibrinolysis.
12. **Chapter 13 (1a-i, ii, iv, v. 1b-ii, iii, iv, v, vi. 2a-iii. 2c-i, ii, iii, iv. 2d-i, ii.)**
    a. Contrast the clinical usefulness of urinalysis and classify tests pertaining to diseases or conditions affecting the kidney or urinary tract and metabolic disease.
    b. Differentiate various urine specimen requirements for a routine urinalysis, including preservation and storage requirements.

c. Categorize various types of urine collection, including midstream clean-catch, quantitative, and timed specimens and compare the differences.
d. Correlate normal and abnormal physical properties that might be encountered in urine specimens with physical findings with chemical and microscopic findings.
e. Correlate the relationship between urine volume and specific gravity.

13. **Chapter 14 (1a-i, ii, iv, v. 1b-ii, iii, iv, v, vi. 2a-iii. 2c-i, ii, iii, iv. 2d-i, ii.)**
    a. Name various types of body fluids and synonyms.
    b. Differentiate a traumatic tap from a hemorrhage on the basis of gross appearance of the spinal fluid.
    c. Identify the serous fluids, and describe the components of their routine examination.
    d. Differentiate a transudate from an exudate.
    e. Define synovial fluid, and describe the components of a routine synovial fluid examination.
14. **Chapter 15 (1a-i, ii, iv, v. 1b-ii, iii, iv, v, vi. 2a-iii. 2c-i, ii, iii, iv. 2d-i, ii.)**
    a. Explain the principle of the Gram stain reaction for Gram positive and Gram negative bacteria.
    b. Select and inoculate the appropriate media for frequently collected specimens: urine, throat swabs, genitourinary exudates, and blood.
    c. Explain the collection of an appropriate specimen for a urine culture, quantitatively plate, and interpret results.
    d. Describe the collection process using a swab for a throat culture on sheep blood agar, plate it have and interpret results.
    e. Explain the collection of a blood for culture, and describe how to process and interpret the result primary culture result.
15. **Chapter 16 (1a-i, ii, iv, v. 1b-ii, iii, iv, v, vi. 2a-iii. 2c-i, ii, iii, iv. 2d-i, ii.)**
    a. Define the term immunology, antigen, and antibody.
    b. Compare the characteristics of the four phases of an immune response.
    c. Explain the mode of activation and consequences of complement activation.
    d. Contrast the functions of natural immunity and adaptive immunity.
    e. Correlate the cellular and humoral components of adaptive immunity.
16. **Chapter 17 (1a-i, ii, iv, v. 1b-ii, iii, iv, v, vi. 2a-iii. 2c-i, ii, iii, iv. 2d-i, ii.)**
    a. Define the terms immunohematology, blood banking, and transfusion medicine.
    b. Compare autologous and directed blood donations.
    c. Explain the role of antigens and antibodies in immunohematology.
    d. Explain the concept of universal donors and recipients.
    e. Differentiate what is meant by “Rh negative” and “Rh positive.”

Course Content

A general description of lecture/discussion topics included in this course are listed in the Learning Objectives / Specific Course Objectives sections of this syllabus.

Methods of Instruction/Course Format/Delivery

This course is offered in online format. Students will be fully responsible with keeping track of all assignments due dates, as well as being aware of the testing center times for the four mandatory proctored exams.

Students are expected to demonstrate basic competency in reading, writing, oral communication, math have and computer skills. Proficiency will be measured by quizzes, assignments, three regular examinations have and the comprehensive final exam.

Major Assignments/Assessments

The following items are assigned and assessed during the semester and used to calculate the student's final grade.

Assignments

Assignments

Students will purchase Science Interactive voucher codes through the College Store for all laboratory assignments.

Course Grade

The grading scale for this course is as follows:

- Homework – 20%
- Quizzes – 15%
- Exams – 25%
- Labs - 25%
- Final Exam – 15%
- Total – 100%

Texts Materials, and Supplies

Clinical Laboratory Science	NO	Required	9780323530828

Other

- Courses conducted via video conferencing may be recorded and shared for instructional purposes by the instructor.
- For current texts and materials, use the following link to access bookstore listings: https://www.panolacollegestore.com.
- For testing services, use the following link: https://www.panola.edu/student-services/studentsupport/academic-testing-center.
- The Accommodations & Disability Support (A&DS) Office at Panola College provides and facilitates support services and accommodations for students with disabilities. The A&DS office works under the federal guidelines included in Section 503 of the Rehabilitation Act of 1973 and the American with Disabilities Act. Please contact the Accommodations & Disability Support (A&DS) Office located in the Charles C. Matthews Student Center or go to https://www.panola.edu/disabilitysupport for more information.
- Withdrawing from a course is the student's responsibility. Students who do not attend class and who do not withdraw will receive the grade earned for the course.
- Student Handbook: https://www.panola.edu/ (located on at the bottom under student)

SCANS Criteria

1. Foundation skills are defined in three areas: basic skills, thinking skills, and personal qualities.
    1. Basic Skills: A worker must read, write, perform arithmetic and mathematical operations, listen, and speak effectively. These skills include:
        1. Reading: locate, understand, and interpret written information in prose and in documents such as manuals, graphs, and schedules.
        2. Writing: communicate thoughts, ideas, information, and messages in writing, and create documents such as letters, directions, manuals, reports, graphs, and flow charts.
        3. Arithmetic and Mathematical Operations: perform basic computations and approach practical problems by choosing appropriately from a variety of mathematical techniques.
        4. Listening: receive, attend to, interpret, and respond to verbal messages and other cues.
        5. Speaking: Organize ideas and communicate orally.
    2. Thinking Skills: A worker must think creatively, make decisions, solve problems, visualize, know how to learn, and reason effectively. These skills include:
        1. Creative Thinking: generate new ideas.
        2. Decision Making: specify goals and constraints, generate alternatives, consider risks, and evaluate and choose the best alternative.
        3. Problem Solving: recognize problems and devise and implement plan of action.
        4. Visualize ("Seeing Things in the Mind's Eye"): organize and process symbols, pictures, graphs, objects, and other information.
        5. Knowing How to Learn: use efficient learning techniques to acquire and apply new knowledge and skills.
        6. Reasoning: discover a rule or principle underlying the relationship between two or more objects and apply it when solving a problem.
    3. Personal Qualities: A worker must display responsibility, self-esteem, sociability, self management, integrity, and honesty.
        1. Responsibility: exert a high level of effort and persevere toward goal attainment.

    2. Self-Esteem: believe in one's own self-worth and maintain a positive view of oneself.
    3. Sociability: demonstrate understanding, friendliness, adaptability, empathy, and politeness in group settings.
    4. Self-Management: assess oneself accurately, set personal goals, monitor progress, and exhibit self-control.
    5. Integrity and Honesty: choose ethical courses of action.
2. Workplace competencies are defined in five areas: resources, interpersonal skills, information, systems, and technology.
    1. Resources: A worker must identify, organize, plan, and allocate resources effectively.
        1. Time: select goal-relevant activities, rank them, allocate time, and prepare and follow schedules.
        2. Money: Use or prepare budgets, make forecasts, keep records, and make adjustments to meet objectives.
        3. Material and Facilities: Acquire, store, allocate, and use materials or space efficiently. Examples: construct a decision timeline chart; use computer software to plan a project; prepare a budget; conduct a cost/benefits analysis; design an RFP process; write a job description; develop a staffing plan.
    2. Interpersonal Skills: A worker must work with others effectively.
        1. Participate as a Member of a Team: contribute to group effort.
        2. Teach Others New Skills.
        3. Serve Clients/Customers: work to satisfy customer's expectations.
        4. Exercise Leadership: communicate ideas to justify position, persuade and convince others, responsibly challenge existing procedures and policies.
        5. Negotiate: work toward agreements involving exchange of resources, resolve divergent interests.
        6. Work with Diversity: work well with men and women from diverse backgrounds. Examples: collaborate with a group member to solve a problem; work through a group conflict situation, train a colleague; deal with a dissatisfied customer in person; select and use appropriate leadership styles; use effective delegation techniques; conduct an individual or team negotiation; demonstrate an understanding of how people from different cultural backgrounds might behave in various situations.
    3. Information: A worker must be able to acquire and use information.
        1. Acquire and Evaluate Information.
        2. Organize and Maintain Information.
        3. Interpret and Communicate Information.
        4. Use Computers to Process Information. Examples: research and collect data from various sources; develop a form to collect data; develop an inventory record-keeping system; produce a report using graphics; make an oral presentation using various media; use on-line computer databases to research a report; use a computer spreadsheet to develop a budget.
    4. Systems: A worker must understand complex interrelationships.
        1. Understand Systems: know how social, organizational, and technological systems work and operate effectively with them.
        2. Monitor and Correct Performance: distinguish trends, predict impacts on system operations, diagnose deviations in systems' performance and correct malfunctions.
        3. Improve or Design Systems: suggest modifications to existing systems and develop new or alternative systems to improve performance. Examples: draw and interpret an organizational chart; develop a monitoring process; choose a situation needing improvement, break it down, examine it, propose an improvement, and implement it.
    5. Technology: A worker must be able to work with a variety of technologies.
        1. Select Technology: choose procedures, tools or equipment including computers and related technologies.
        2. Apply Technologies to Task: understand overall intent and proper procedures for setup and operation of equipment.
        3. Maintain and Troubleshoot Equipment: Prevent, identify, or solve problems with equipment, including computers and other technologies. Examples: read equipment descriptions and

technical specifications to select equipment to meet needs; set up and assemble appropriate equipment from instructions; read and follow directions for troubleshooting and repairing equipment.