



## **Course Syllabus**

### **MLAB 2434- CLINICAL MICROBIOLOGY**

*Revision Date: 3/21/2017*

**Catalog Description:** Instruction in the theory, practical application, and pathogenesis of clinical microbiology, including collection, quality control, quality assurance, safety, setup, identification, susceptibility testing, and reporting results.

**Prerequisites:** BIOL 2420, Enrollment in this course and the Medical Laboratory Technology Program require department head approval and successful completion of the admissions process. Students must be accepted into the MLT Program.

**Semester Credit Hours:** 4

**Lecture Hours per Week:** 4

**Lab Hours per Week:** 1

**Contact Hours per Semester:** 128

**State Approval Code:** 5110040000

**Instructional Goals and Purposes:** This course consists of instruction in the history, practical application, and pathogenesis of clinical microbiology, including collection, setup, identification, susceptibility testing, and reporting procedures. The laboratory exercises will endeavor to provide the student with the most comprehensive experiences possible, but will rely mainly on the commonly measured differential characteristics of select bacterial groups.

#### **Learning Outcomes:**

1. Apply principles of safety, quality assurance and quality control in Clinical Microbiology
2. Evaluate specimen acceptability.
3. Describe morphology and physiology of microbes.
4. Identify and classify microorganisms.
5. Demonstrate sterile technique.
6. Perform and interpret antimicrobial susceptibility testing.
7. Select additional procedures based on preliminary results
8. Correlate test results with patient condition(s).

#### **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. 1c-i, ii, iv. 2a-i. 2c-i, ii, iii, iv)**
  - a. Discuss the purpose of clinical microbiology
  - b. Describe the binomial system of taxonomy and discuss how phenotypic and molecular characteristics are used to classify bacteria.
  - c. Differentiate the gram-positive cell wall from the gram-negative cell wall.
  - d. State the function of pili, fimbriae, flagella, and the capsule.
  - e. Define the following terms:
    - i. Infection
    - ii. Infectious disease

- iii. True pathogen
  - iv. Opportunistic pathogen
  - v. Nosocomial infection
  - vi. Endogenous infection
  - vii. Asymptomatic carriage (carriers)
  - viii. Colonization
- f. Define and contrast:
- i. endemic and epidemic
  - ii. disease prevalence and incidence
- g. Define normal flora and discuss its role in each of the following sites:
- i. Mouth and oral cavity
  - ii. Nasopharynx
  - iii. Stomach and small intestine
  - iv. Colon
- h. List and describe the major routes of infection.
- i. Describe the following host defense mechanisms:
- i. Innate (natural) immunity
  - ii. Inflammatory response
  - iii. Acquired Immunity
  - iv. Humoral immunity
  - v. Cell-mediated immunity
- j. Summarize the functions of T and B cells.
- k. Define and describe endotoxins and exotoxins.
- l. List laboratory procedures that might be requested to identify infectious disease.
- 2. Chapter 2 (1a-i, ii, iv, v, 1b-ii, iii, iv, v, vi, 1c-i, ii, iv, 2a-i, 2c-i, ii, iii, iv)**
- a. List and describe the possible routes of laboratory-acquired infections.
  - b. Name the agencies that recommend policy for laboratory safety.
  - c. Discuss the concepts of standard precautions and universal precautions.
  - d. Discuss personal protective equipment and its purpose in the clinical laboratory.
  - e. Summarize the criteria for and differentiate Biosafety Levels 1, 2, 3, and 4.
  - f. List and define the five types of hazardous chemicals.
- 3. Chapter 3 (1a-i, ii, iv, v, 1b-ii, iii, iv, v, vi, 1c-i, ii, iv, 2a-i, 2c-i, ii, iii, iv)**
- a. List and discuss the basic concepts for proper specimen collection.
  - b. Recognize samples that are not suitable and suggest appropriate corrective action.
  - c. Describe collection requirements for:
    - i. nasopharyngeal
    - ii. sputum
    - iii. urine (clean catch, catheterized, suprapubic)
    - iv. wound
    - v. stool
    - vi. cerebro
    - vii. throat
    - viii. spinal fluid (CSF)
    - ix. genital (male urethral, female vaginal and cervical)
    - x. blood
  - d. Discuss proper specimen transport for microbiology.
  - e. Using Bartlett's classification, determine whether a sputum sample is acceptable or contaminated.
  - f. List and discuss important quality control measures used in the microbiology laboratory.
  - g. For each media state the purpose and important components:
    - i. sheep blood agar
    - ii. chocolate agar
    - iii. modified thayer-martin
    - iv. macconkey
    - v. thioglycollate
    - vi. HE agar

- h. Identify the types of hemolysis observed on sheep blood agar.
  - i. Discuss how the following tests can be used in the preliminary identification of bacteria:
    - i. catalase
    - ii. oxidase
    - iii. coagulase
    - iv. PYR hydrolysis
    - v. carbohydrate utilization
4. **Chapter 4 (1a-i, ii, iv, v. 1b-ii, iii, iv, v, vi. 1c-i, ii, iv. 2a-i. 2c-i, ii, iii, iv)**
- a. Recognize and state the function of the parts of the microscope.
  - b. Describe the use of darkfield microscopy in clinical microbiology.
  - c. Explain the principle and use of fluorescent microscopy.
  - d. State the purpose of each of the following direct methods of examination:
    - i. Saline mount
    - ii. Hanging drop
    - iii. Iodine mount
    - iv. Potassium hydroxide preparation
    - v. Nigrosin
    - vi. Neufeld (Quellung) reaction
  - e. State the reagents used in gram stain and the function of each.
  - f. Interpret gram stains- gram reaction, shape, and morphology.
  - g. List the stain used to stain Mycobacterium and explain why these bacteria are referred to as "acid-fast."
5. **Chapter 5 (1a-i, ii, iv, v. 1b-ii, iii, iv, v, vi. 1c-i, ii, iv. 2a-i. 2c-i, ii, iii, iv)**
- a. State the principle of colorimetry and how it is used in identification systems.
  - b. State the principle of operation of:
    - i. BD Phoenix
    - ii. VITEK
    - iii. Microscan WalkAway
  - c. Define:
    - i. Affinity
    - ii. Avidity
    - iii. Epitope
    - iv. Specificity
    - v. Cross-reactivity
  - d. Differentiate direct immunofluorescence from indirect immunofluorescence.
  - e. Define titer and explain its significance in confirming the infection.
6. **Chapter 6**
- a. Define the following terms:
    - i. Antibiotic
    - ii. Antimicrobial agent
    - iii. Bactericidal
    - iv. Bacteriostatic
  - b. Differentiate narrow-spectrum from broad-spectrum antibiotics.
  - c. State the mode of activity for major antibiotic classes:
    - i.  $\beta$ -lactam antibiotics
    - ii. Alteration of cell membrane
    - iii. Inhibitors of protein synthesis
    - iv. Folic acid antimetabolites
    - v. Inhibitors of DNA gyrase
  - d. List antiviral agents used to treat HIV and other viral infections.
  - e. Differentiate acquired resistance and intrinsic resistance.
  - f. Define the following:
    - i. Susceptible
    - ii. Resistant
    - iii. Synergistic
    - iv. Antagonistic

- g. Describe disk diffusion, interpretation, and factors effecting testing.
  - h. Interpret  $\beta$ -lactamase testing.
  - i. Discuss resistance in *Staphylococcus aureus* (methicillian-resistance) and *Enterococcus* (vancomycin resistance) and how it is detected.
  - j. Define peak and trough.
  - k. State the purpose of an antibiogram.
7. **Chapter 7 (1a-i, ii, iv, v, 1b-ii, iii, iv, v, vi. 1c-i, ii, iv. 2a-i. 2c-i, ii, iii, iv)**
- a. Discuss the classification of catalase-positive and catalase-negative gram-positive cocci.
  - b. List the media on which *Staphylococcus* can be isolated.
  - c. Describe the methods that differentiate *Staphylococcus* and *Streptococcus*.
  - d. Differentiate between the coagulase tube test, slide coag test, and latex test including what they detect.
  - e. Differentiate *Staphylococcus aureus* from coagulase-negative staphylococci.
  - f. Define the following as they pertain to *Staphylococcus aureus*:
    - i. Protein A
    - ii. Capsular polysaccharide
    - iii. Coagulase
    - iv. Entertoxins
    - v. Hemolysins
    - vi. Toxic Shock Syndrome
    - vii.  $\beta$ -lactamase
  - g. List and describe common infections (serious and non-serious) caused by *Staphylococcus aureus*.
  - h. Define the MRSA and VRSA and the methods used to detect each.
    - i. Discuss the identification of *Staph saprophyticus*.
8. **Chapter 8 (1a-i, ii, iv, v, 1b-ii, iii, iv, v, vi. 1c-i, ii, iv. 2a-i. 2c-i, ii, iii, iv)**
- a. Describe the characteristics of the genus *Streptococcus*.
  - b. List media typically used to isolate streptococci.
  - c. List and describe the types of hemolysis.
  - d. Give the Lancefield group and preliminary tests used to identify:
    - i. *S. pyogenes*
    - ii. *S. agalactiae*
    - iii. *Enterococcus*
    - iv. *Streptococcus bovis* group
  - e. List the primary infections caused by group A *Streptococcus*.
  - f. Discuss the role of group B streptococcus as a neonatal pathogen.
  - g. Discuss how the viridans streptococci are classified and list the significant species.
  - h. Discuss the procedure and purpose of the optochin test.
  - i. Discuss the significance of vancomycin-resistant *Enterococcus*.
  - j. Discuss the virulence of *Strep pneumoniae*.
9. **Chapter 9 (1a-i, ii, iv, v, 1b-ii, iii, iv, v, vi. 1c-i, ii, iv. 2a-i. 2c-i, ii, iii, iv)**
- a. Discuss the general morphological and biochemical characteristics of *Neisseria*.
  - b. Describe the special growth requirements for the pathogenic *Neisseria*.
  - c. List and describe the infections associated with *Neisseria gonorrhoeae*.
  - d. List and compare the media selective for the isolation of *N.gonorrhoeae*.
  - e. Describe how specimens for *Neisseria meningitidis* are cultured and processed.
  - f. Explain the infectious process of *Neisseria meningitidis*.
  - g. Based on growth characteristics and biochemical reactions differentiate the following:
    - i. *N. gonorrhoeae*
    - ii. *N. meningitidis*
    - iii. *M. catarrhalis*
    - iv. *N. subflava*
    - v. *N. flavescens*
10. **Chapter 10 (1a-i, ii, iv, v, 1b-ii, iii, iv, v, vi. 1c-i, ii, iv. 2a-i. 2c-i, ii, iii, iv)**
- a. List and describe the serological characteristics of the members of *Enterobacteriaceae*.
  - b. Describe the biochemical reactions that are characteristic for the *Enterobacteriaceae*.

- c. Describe the isolation, identification, and infections of *Escherichia coli*.
  - d. Discuss the significance of diarrheagenic *E. coli*.
  - e. Discuss the identification and infections associated with the subgroups of *Shigella*.
  - f. Describe the identification of, characteristics of, and infections associated with *Klebsiella* sp.
  - g. Discuss the classification of *Salmonella*.
  - h. Identify *Proteus* on media.
  - i. Differentiate *Citrobacter* from *Salmonella*.
  - j. List and discuss the clinical significance of the three species of *Yersinia*.
11. **Chapter 11 (1a-i, ii, iv, v, 1b-ii, iii, iv, v, vi, 1c-i, ii, iv, 2a-i, 2c-i, ii, iii, iv)**
- a. Describe infections associated with nonfermentative gram-negative bacilli.
  - b. Differentiate nonfermenters, fermenters, and nonsaccharolytic organisms on oxidateive-fermentative medium.
  - c. Discuss the characteristics of the *Pseudomonadaceae*.
  - d. Explain how *Pseudomonas aeruginosa* is identified and describe its unique characteristics.
  - e. Discuss the types of infections associated with *P. aeruginosa* and the populations that are most susceptible to infections.
  - f. Briefly discuss the identification and clinical significance of:
    - i. *P. fluoresces*
    - ii. *P. putida*
    - iii. *P. stutzeri*
    - iv. *P. Mendocino*
  - g. Discuss the clinical relevance and identifying characteristics of:
    - i. *P. malei*
    - ii. *B. pseudomallei*
    - iii. *B. cepacia*
  - h. Describe the clinical significance of *Acintobacter*.
  - i. Describe the clinical significant *Alcaligenes*, *Achromobacher*, *Moraxella*, and *Oligella*.
  - j. Give the unique characteristics associated with *C. indologenes* and *C. meningosepticum*.
12. **Chapter 12 (1a-i, ii, iv, v, 1b-ii, iii, iv, v, vi, 1c-i, ii, iv, 2a-i, 2c-i, ii, iii, iv)**
- a. Explain why the number of miscellaneous gram-negative bacilli associated with human infections has increased.
  - b. Define:
    - i. halophilic
    - ii. capnophilic
    - iii. microaerophilic
  - c. Discuss the clinical significance and identification of:
    - i. *Vibrio parahemolyticus*
    - ii. *Vibrio vulnificus*
    - iii. *Vibrio mimicus*
  - d. Describe the unique characteristics and infectivity of the genus *Campylobacter* (*C. jejuni* subspecies *jejuni*, from *C. coli*).
  - e. Explain the clinical significance of *Helicobacter pylori*.
  - f. Describe the clinical significance of *Aeromonas* and *Plesiomonas*, differentiate them, and describe how each is identified.
13. **Chapter 13 (1a-i, ii, iv, v, 1b-ii, iii, iv, v, vi, 1c-i, ii, iv, 2a-i, 2c-i, ii, iii, iv)**
- a. Describe the general morphological and biochemical characteristics of *Haemophilus*.
  - b. Describe X and V factors and indicate a source for each.
  - c. Explain how *H. influenzae* is identified form a clinical specimen and give its important biochemical characteristics.
  - d. List the serotypes of *H. influenzae* and indicate which is most frequently in human infection.
  - e. Give the clinical significance of each:
    - i. *H. ducreyi*
    - ii. *H. aegyptius*
    - iii. *H. parainfluenzae*
    - iv. *H. haemolyticus*

- f. Give the etiologic agent of Legionnaires' disease and describe and compare the types of legionellosis.
  - g. Give the media required for isolation, infectious process, identification process for:
    - i. *Bordetella pertussis*
    - ii. *Brucella*
    - iii. *Pasteurella*
    - iv. *Francisella*
  - h. Name and describe the organism associated with rat-bite fever.
  - i. Explain the acronym HACEK.
14. **Chapter 14 (1a-i, ii, iv, v, 1b-ii, iii, iv, v, vi. 1c-i, ii, iv. 2a-i. 2c-i, ii, iii, iv)**
- a. Describe the significant morphological and microscopic characteristics of the genus *Bacillus*.
  - b. List and describe the types of anthrax.
  - c. Compare and contrast *Bacillus anthracis* and *Bacillus cereus*.
  - d. Describe and recognize diphtheroids.
  - e. Discuss identification and infectious process of *Corynebacterium diphtheriae*.
  - f. Describe the identification and clinical significance of *Listeria monocytogenes*.
  - g. Discuss the clinical relevance and identification of *Lactobacillus* and *Erysipelothrix rhusiopathiae*.
  - h. Discuss clinical significance and differentiation of *Nocardia*.
  - i. Describe the characteristics of *Gardnerella* and its relevance.
15. **Chapter 15 (1a-i, ii, iv, v, 1b-ii, iii, iv, v, vi. 1c-i, ii, iv. 2a-i. 2c-i, ii, iii, iv)**
- a. Name the etiologic agent or tick/lice vectors for the following borreliosis:
    - i. Relapsing fever
    - ii. Lyme disease
  - b. Describe the transmission and diagnosis of Lyme Disease.
  - c. Explain the stages of Lyme disease.
  - d. Give the etiological agent of the following:
    - i. Syphilis (venereal)
    - ii. Yaws
    - iii. Pinta
    - iv. Endemic syphilis (nonvenereal)
  - e. Discuss the identification of primary, secondary, and tertiary syphilis.
  - f. Compare and contrast the treponemal and nontreponemal tests for syphilis:
    - i. RPR, VDRL, TPPA, FTA-absorbed, TPI, MHA
  - g. Give the etiological agent of leptospirosis and describe its characteristics.
16. **Chapter 16 (1a-i, ii, iv, v, 1b-ii, iii, iv, v, vi. 1c-i, ii, iv. 2a-i. 2c-i, ii, iii, iv)**
- a. Define and differentiate among obligate, facultative, and obligate anaerobes.
  - b. Identify three anaerobes that are normal flora of the body and identify their sites.
  - c. Explain methods for obtaining an anaerobic environment for cultures.
  - d. Give the clinical relevance and important characteristics of the following anaerobes:
    - i. *Bacteroides fragilis*
    - ii. *Prevotella intermedia*
    - iii. *Porphyromonas asaccharolyticus*
    - iv. *Fusobacterium* sp.
    - v. *Peptostreptococcus anaerobius*
    - vi. *Parvimonas*
  - e. Discuss identification and disease states associated with each of the following:
    - i. *C. botulinum*
    - ii. *C. tetani*
    - iii. *C. perfringens*
    - iv. *C. difficile*
17. **Chapter 17 (1a-i, ii, iv, v, 1b-ii, iii, iv, v, vi. 1c-i, ii, iv. 2a-i. 2c-i, ii, iii, iv)**
- a. Explain why mycobacterium is known as "acid-fast bacilli."
  - b. Discuss safety measures when working with Mycobacteria.
  - c. Name and give examples of three categories of media used to cultivate mycobacteria.
  - d. Contrast the Kinyoun and Ziehl-Neelsen stains.

- e. List the members of the Mycobacterium tuberculosis complex and describe their clinical relevance.
  - f. Describe the infectious process of tuberculosis including transmission.
  - g. Discuss the purpose and principle of the tuberculin skin test.
  - h. Discuss how TB is treated, list first- and second-line drugs.
  - i. Define Runyon group.
18. **Chapter 18 (1a-i, ii, iv, v, 1b-ii, iii, iv, v, vi, 1c-i, ii, iv, 2a-i, 2c-i, ii, iii, iv)**
- a. State the distinguishing characteristics of the genus Chlamydia.
  - b. Describe the diseases and identification of:
    - i. Chlamydia trachomatis
    - ii. Chlamydophila pneumoniae
    - iii. Chlamydophila psittaci
  - c. Describe the lifecycle Chlamydia.
  - d. List the important characteristics Mycoplasma.
  - e. Discuss the infectious diseases associated with Mycoplasma pneumoniae.
  - f. List the clinically significant genital mycoplasmas and ureaplasmas and name the associated infections.
  - g. For each of the following diseases, name the etiological agent, vector, and animal reservoir.
    - i. Rocky Mountain spotted fever
    - ii. Rickettsialpox
    - iii. Endemic typhus
    - iv. Brill-Zinsser disease
    - v. Scrub typhus
    - vi. Ehrlichiosis
    - vii. Human anaplasmosis
    - viii. Q fever
19. **Chapter 19 (1a-i, ii, iv, v, 1b-ii, iii, iv, v, vi, 1c-i, ii, iv, 2a-i, 2c-i, ii, iii, iv)**
- a. Define the terms virion and capsid.
  - b. Discuss the general structural characteristics of viruses.
  - c. Classify medically important viruses as DNA or RNA.
  - d. Describe the viral replication cycle.
  - e. Name the methods for direct detection of viral antigens and genes.
  - f. Explain how viral antibodies can be detected serologically and describe the antibody response to a typical viral infection.
  - g. Discuss type and route of infection of the following:
    - i. Adenovirus
    - ii. Herpes Simplex 1 and 2
    - iii. Varicella-zoster
    - iv. Cytomegalovirus
    - v. Epstein-Barr virus
    - vi. Human papillomavirus
    - vii. Poliovirus
    - viii. Influenza viruses
    - ix. Rotavirus
  - h. Compare the 5 Hepatitis viruses with respect to epidemiology and disease.
    - i. Name and describe the serological markers for hepatitis B virus.
    - j. Name the agents of the following viral infections:
      - i. Roseola
      - ii. Erythema infectiosum
      - iii. Smallpox
      - iv. Common Cold
      - v. Mumps
      - vi. Rabies
  - k. Define Retroviridae.
    - l. Describe the structure, transmission, clinical symptoms, and tests used to identify HIV.
20. **Chapter 22 (1a-i, ii, iv, v, 1b-ii, iii, iv, v, vi, 1c-i, ii, iv, 2a-i, 2c-i, ii, iii, iv)**

- a. Discuss proper skin preparation for collection of blood cultures.
  - b. Discuss the aspects of blood culture collection- timing, number of specimens, volume, and anticoagulants.
  - c. List the common microorganisms associated with septicemia.
  - d. List the microorganisms most often associated with bacterial and viral meningitis.
  - e. Discuss the proper screen of sputum samples.
  - f. List microorganisms commonly associated with:
  - g. lower respiratory infections
    - i. urinary tract infections.
    - ii. lower GI tract
    - iii. sexually transmitted diseases
    - iv. wound/abscess infections
    - v. sterile body fluid infection
    - vi. infection of eye and ear
21. **Lab #1 (1a-i, ii, iv, v. 1b-ii, iii, iv, v, vi. 1c-i, ii, iv. 2a-i. 2b-i, ii, iv, v, vi. 2c-i, ii, iii, iv)**
- a. Discuss proper skin preparation for collection of blood cultures.
  - b. Discuss the aspects of blood culture collection- timing, number of specimens, volume, and anticoagulants.
  - c. List the common microorganisms associated with septicemia.
  - d. List the microorganisms most often associated with bacterial and viral meningitis.
  - e. Discuss the proper screen of sputum samples.
  - f. List microorganisms commonly associated with:
  - g. lower respiratory infections
  - h. urinary tract infections.
  - i. lower GI tract
  - j. sexually transmitted diseases
  - k. wound/abscess infections
  - l. sterile body fluid infection
  - m. infection of eye and ear
22. **Lab #2 (1a-i, ii, iv, v. 1b-ii, iii, iv, v, vi. 1c-i, ii, iv. 2a-i. 2b-i, ii, iv, v, vi. 2c-i, ii, iii, iv)**
- a. Discuss proper skin preparation for collection of blood cultures.
  - b. Discuss the aspects of blood culture collection- timing, number of specimens, volume, and anticoagulants.
  - c. List the common microorganisms associated with septicemia.
  - d. List the microorganisms most often associated with bacterial and viral meningitis.
  - e. Discuss the proper screen of sputum samples.
  - f. List microorganisms commonly associated with:
  - g. lower respiratory infections
  - h. urinary tract infections.
  - i. lower GI tract
  - j. sexually transmitted diseases
  - k. wound/abscess infections
  - l. sterile body fluid infection
  - m. infection of eye and ear
23. **Lab #3 (1a-i, ii, iv, v. 1b-ii, iii, iv, v, vi. 1c-i, ii, iv. 2a-i. 2b-i, ii, iv, v, vi. 2c-i, ii, iii, iv)**
- a. Employ all skills learned in Lab #1 and #2 to identify two unknown organisms.

**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.

Students in all sections of this course will be required to do the following:

1. Lecture Assignments
2. Lecture Quizzes (fill-in-the-blank)
3. Lecture Exams
4. Final Exam



5. Pre-lab Quizzes
6. In-Lab Assignments
7. Post-lab Assignments
8. Laboratory Practicals

**Methods of Instruction/Course Format/Delivery:**

This is a mainly online course so it will require a lot of outside proactive work by the student. The instructor will provide guidance as needed. The student will be evaluated by assignments and quizzes outside of the classroom. The student will be required to come to a Panola College testing Center to take all major examinations. Laboratories will take place on three pre-determined Saturdays during the semester and will be mandatory. During the laboratories the students will be evaluated by case studies, in-lab assignments, and lab practicals as assigned by the instructor.

**Major Assignments / Assessments:**

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

**Assignments**

1. Lecture Assignments- Chapters 1, 3, 4, 7, 12, 13, 14, 16, 18, 22
2. Lecture Quizzes- Chapters 1-19,22
3. Pre-lab Quizzes- #1, #2, #3
4. In-lab work: Gram Staining, Biochemical Tests, Unknowns
5. Post-Lab Cases- #2, #3

**Assessment(s):**

1. Take-home Exam #1
2. Proctored Exams- #2, #3
3. Final Exam
4. Lab Practicals- #1, #2, #3

**Course Grade:**

The grading scale for this course is as follows:

- **Lecture-- 2/3 of Final Grade**
  - Major Exams-- 50%
  - Quizzes-- 15%
  - Homework Assignments-- 20%
  - Final Exam-- 15%
- **Laboratory— 1/3 of Final Grade**
  - Pre-Lab Quizzes-- 10%
  - Case Assignments-- 20%
  - In- Lab Assignments-- 20%
  - Practicals-- 50%

**Texts, Materials, and Supplies:**

- Sunheimer, Robert. (2011). *Clinical Laboratory Chemistry (w/access)*. Pearson. 11th edition. ISBN 9780131721715.
- White Laboratory Coat

**Required Readings:**

- Course Textbook
- All information given in Canvas

**Recommended Readings:**

- Medical Dictionary (reference)
- LabTestsOnline.org (reference)

**Other:**

- For current texts and materials, use the following link to access bookstore listings: <http://www.panolacollegestore.com>
- For testing services, use the following link: <http://www.panola.edu/elearning/testing.html>
- If any student in this class has special classroom or testing needs because of a physical learning or emotional condition, please contact the ADA Student Coordinator in Support Services located in the Administration Building or go to <http://www.panola.edu/student-success/disability-support-services/> 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, *The Pathfinder*: <http://www.panola.edu/student-success/documents/pathfinder.pdf>

**More Information:**

Laboratory Dress Code

The student will be expected to attend class clean and neatly dressed in long pants or scrubs and wear closed-toe shoes. A laboratory coat will must be worn snapped or buttoned up during all laboratory sessions. Hair that is shoulder length or longer must be worn up or securely tied back. Gloves must be worn when handling biological materials.

Behavioral Conduct

While a student is representing Panola College as a Medical Laboratory Technology student, they will be expected to conduct themselves in such a manner as to reflect favorably on themselves and on the Program. If a student acts in such a manner as to reflect immature judgment or disrespect for others, the student will be called before the MLT Department Chair for determination of their status in the Program. Inappropriate conduct is grounds discipline and may be cause for immediate probation or dismissal from the Program.

Academic Dishonesty

Under no circumstances shall a student submit work that is not their own. Copying answers for study questions, cheating on exams and/or submitting laboratory results which are not your own are expressly prohibited.

Time Commitment

According to "Hints on How to Succeed in College Classes"

<http://tinyurl.com/3dqegz> you should budget your time per week for this four hour credit course as follows:

1. Reading assigned text 2 to 3 hours
2. Homework assignments 3 to 6 hours
3. Time for review and test preparation 3 hours
4. Total study time per week 8 to 12 hours PER WEEK

## SCANS CRITERIA

- 1) **Foundation skills are defined in three areas: basic skills, thinking skills, and personal qualities.**
  - a) **Basic Skills:** A worker must read, write, perform arithmetic and mathematical operations, listen, and speak effectively. These skills include:
    - i) Reading: locate, understand, and interpret written information in prose and in documents such as manuals, graphs, and schedules.
    - ii) Writing: communicate thoughts, ideas, information, and messages in writing, and create documents such as letters, directions, manuals, reports, graphs, and flow charts.
    - iii) Arithmetic and Mathematical Operations: perform basic computations and approach practical problems by choosing appropriately from a variety of mathematical techniques.
    - iv) Listening: receive, attend to, interpret, and respond to verbal messages and other cues.
    - v) Speaking: Organize ideas and communicate orally.
  - b) **Thinking Skills:** A worker must think creatively, make decisions, solve problems, visualize, know how to learn, and reason effectively. These skills include:
    - i) Creative Thinking: generate new ideas.
    - ii) Decision Making: specify goals and constraints, generate alternatives, consider risks, and evaluate and choose the best alternative.
    - iii) Problem Solving: recognize problems and devise and implement plan of action.
    - iv) Visualize ("Seeing Things in the Mind's Eye"): organize and process symbols, pictures, graphs, objects, and other information.
    - v) Knowing How to Learn: use efficient learning techniques to acquire and apply new knowledge and skills.
    - vi) Reasoning: discover a rule or principle underlying the relationship between two or more objects and apply it when solving a problem.
  - c) **Personal Qualities:** A worker must display responsibility, self-esteem, sociability, self-management, integrity, and honesty.
    - i) Responsibility: exert a high level of effort and persevere toward goal attainment.
    - ii) Self-Esteem: believe in one's own self-worth and maintain a positive view of oneself.
    - iii) Sociability: demonstrate understanding, friendliness, adaptability, empathy, and politeness in group settings.
    - iv) Self-Management: assess oneself accurately, set personal goals, monitor progress, and exhibit self-control.
    - v) Integrity and Honesty: choose ethical courses of action.
- 2) **Workplace competencies are defined in five areas: resources, interpersonal skills, information, systems, and technology.**
  - a) **Resources:** A worker must identify, organize, plan, and allocate resources effectively.
    - i) Time: select goal-relevant activities, rank them, allocate time, and prepare and follow schedules.
    - ii) Money: Use or prepare budgets, make forecasts, keep records, and make adjustments to meet objectives.
    - iii) Material and Facilities: Acquire, store, allocate, and use materials or space efficiently. Examples: construct a decision time line 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.
  - b) **Interpersonal Skills:** A worker must work with others effectively.
    - i) Participate as a Member of a Team: contribute to group effort.
    - ii) Teach Others New Skills.
    - iii) Serve Clients/Customers: work to satisfy customer's expectations.

- iv) **Exercise Leadership:** communicate ideas to justify position, persuade and convince others, responsibly challenge existing procedures and policies.
- v) **Negotiate:** work toward agreements involving exchange of resources, resolve divergent interests.
- vi) **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.

- c) **Information:** A worker must be able to acquire and use information.

- i) **Acquire and Evaluate Information.**
- ii) **Organize and Maintain Information.**
- iii) **Interpret and Communicate Information.**
- iv) **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 data bases to research a report; use a computer spreadsheet to develop a budget.

- d) **Systems:** A worker must understand complex interrelationships.

- i) **Understand Systems:** know how social, organizational, and technological systems work and operate effectively with them.
- ii) **Monitor and Correct Performance:** distinguish trends, predict impacts on system operations, diagnose deviations in systems' performance and correct malfunctions.
- iii) **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.

- e) **Technology:** A worker must be able to work with a variety of technologies.

- i) **Select Technology:** choose procedures, tools or equipment including computers and related technologies.
- ii) **Apply Technologies to Task:** understand overall intent and proper procedures for setup and operation of equipment.
- iii) **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.