MERCER
COUNTY COMMUNITY COLLEGE

COURSE OUTLINE

Course Number	Course Title	Credits
MLT 214	Clinical Microbiology	**6**

Hours: Lecture/Lab/Other 5/3	Co- or Pre-requisite permission of program coordinator	Semester & Year Spring 2024

Catalog description:

Principles and methods used in clinical microbiology including isolation, identification, and antibiotic susceptibility testing of pathogenic bacteria. Introduction to medical parasitology, mycology and virology. Laboratory component develops the technical and critical thinking skills used to evaluate clinical microbiology specimens.

General Education Category:
Not GenEd

Course coordinator:
Lisa M. Shave M.S. MLT(ASCP)^{CM}SBB^{CM}
609-570-3387
shavel@mccc.edu

Required texts & Other materials:

Required:
   i. **Textbook:** DeLost, M. D. (2022). Introduction to Diagnostic Microbiology for the Laboratory Sciences (2nd ed.). Burlington, MA: Jones and Bartlett Learning. ISBN-13: 978-1284199734/ ISBN-10: 1284199738
   ii. Instructor-developed **Lab Manual** (purchase through the bookstore)
   iii. MediaLab Subscription (provided by program budget) https://www.medialab.com/

Needed Lab Materials:
   i. White lab coat- This must be a knee-length coat with a fitted wristband/cuff; it reduces the potential for splashes up the arm and fire hazards.
   ii. Gloves - latex or nitrile, not vinyl 4. Pocket calculator
   iii. Black or blue ink pen. (NO WORK IN PENCIL ACCEPTED)
   iv. Sharpie or other permanent marker, fine point, black or blue
   v. 3 ring binder w/Note pages:
      √ Tabs or dividers are needed to identify and separate the following sections: Syllabus - including schedule and unit objectives, lecture PowerPoints, graded materials & other informative material.
      √ Save all procedures, pre-labs, in-lab exercises, case studies and study questions.

Course Student Learning Outcomes (SLO):

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

1. Demonstrate knowledge of and adhere to established guidelines for working with potential pathogens to ensure biohazard safety (Supports ILG# 1, 3)
2. Apply knowledge of specimen integrity. (Supports ILG# 3, 9)
3. Evaluating patient samples for potential pathogens and indigenous microflora. (Supports ILG# 3)
4. Apply the principles of various staining techniques used in the microbiology laboratory to evaluate direct smears from specimens and culture smears (Supports ILG# 3, 11)
5. Identify the phenotypic characteristics of common pathogenic bacteria, parasites, fungi and emerging bioterrorism agents. (Supports ILG# 3)
6. Develop laboratory skill competencies used to:
   a. isolate & identify bacteria
   b. cultivate infectious agents

      c. perform phenotypic and genotypic diagnostic methodologies
      d. set up and interpret antimicrobial susceptibility testing
      e. issue a finalized microbiology reports and
      f. maintain quality control standards
         (Supports ILG# 3, 4, 10, 11)

7. Give a presentation on a common infectious agent including clinical symptoms, laboratory diagnostics and treatment of the microbe (Supports ILG 1, 3, 9, 10)

Course-specific Institutional Learning Goals (ILG):

Institutional Learning Goal 1. Written and Oral Communication in English. Students will communicate effectively in both speech and writing.

Institutional Learning Goal 3. Science. Students will use the scientific method of inquiry, through the acquisition of scientific knowledge.

Institutional Learning Goal 4. Technology. Students will use computer systems or other appropriate forms of technology to achieve educational and personal goals.

Institutional Learning Goal 9. Ethical Reasoning and Action. Students will understand ethical frameworks, issues, and situations.

Institutional Learning Goal 10. Information Literacy: Students will recognize when information is needed and have the knowledge and skills to locate, evaluate, and effectively use information for college level work.

Institutional Learning Goal 11. Critical Thinking: Students will use critical thinking skills understand, analyze, or apply information or solve problems.

Program Learning Outcomes (PLO) for Medical Laboratory Technology

1. Integrate knowledge learned and experienced in the disciplines of general education, mathematics, science, and medical laboratory science;
2. Achieve entry-level career competencies of a medical laboratory technician by testing biological samples using current technology to generate accurate, quality-assured laboratory results used for health and disease evaluation;
3. Utilize critical-thinking skills to assess and problem- solve laboratory data for patient diagnoses;
4. Maintain familiarity with the profession's code of ethics and consistently act within those standards during interactions with fellow classmates and working professionals in the clinical setting;
5. Describe the importance of continuing education in lifelong learning and in obtaining and upholding professional credentialing;
6. Demonstrate academic and technical competence in the professional courses of the curriculum through college and applied clinical education experiences;
7. Take the national ASCP certification exam.

Units of study in detail – Unit Student Learning Outcomes:

<u>Week 1</u> **Intro to Clinical Microbiology, Safety Practices and Preliminary Identification Methods of Microorganisms**
      Infections in Organ Systems
      [Supports Course SLOs #1-6]

Upon completion of this unit the student will be able to:

<u>Learning objectives</u>:

1. Describe the nomenclature used to classify microorganisms (ILG 1, ILG 3)
2. Distinguish between the terms phenotypic and genotypic; prokaryotic and eukaryotic (ILG 1, ILG 3)
3. Describe the different ways microorganisms can transfer genetic information (ILG 1, ILG 3)
4. Explain the different metabolic pathways that microorganisms use to form energy (ILG 1, ILG 3)
5. Define the terms: infection, normal flora, opportunistic pathogen, nosocomial infections (HAIs), endogenous infection, exogenous infection, asymptomatic carriers, colonization, multi drug resistant (MDR), Infection Control Committee, mode of transmission, sentinel event, virulence, isolation precautions, surveillance cultures (ILG 1, ILG 3)
6. Distinguish between humoral and cell mediated immunity (ILG 3)
7. Describe components of a good Quality Assurance program (TQM, CQI, PI, PT, Lean, Six Sigma).
8. Explain how Quality Assurance helps to provide quality patient care? (ILG 1, ILG 3)
9. Explain what a Standard Operating Procedure manual is and why it is important (ILG 1, ILG 3)
10. Explain 'standard precautions' as it applies to a clinical microbiology lab setting (ILG 1, ILG 3)
11. List organisms found in each Biosafety level 1-4 category. Describe the 4 different classes of Biosafety hoods/cabinets (ILG 1, ILG 3)

12. Define the terms used to eliminate microorganisms: sterilization, disinfection & antiseptic (ILG 1, ILG 3)
13. List the physical and chemical methods of hazardous waste material disposal (ILG 1, ILG 3)
14. Explain the purpose of MSDS sheets (ILG 1, ILG 3)
15. List 4 different types of fire extinguishers. Explain how fire extinguishers are properly used in an Emergency (ILG 1, ILG 3)
16. Explain the standard guidelines for packaging and transporting infectious materials (ILG 1, ILG 3)
17. Describe the lab's standard protocol for an accidental exposure to an infectious agent or hazardous material (ILG 1, ILG 3)
18. Explain proper collection methods for microbiology specimens. List some reasons for specimen rejection (ILG 1, ILG 3)
19. Explain the different purposes for different types of media (ILG 1, ILG 3)
20. Describe the proper atmospheric conditions needed for optimal bacterial cultivation (ILG 1, ILG 3)
21. Describe the difference in the cell wall formation of gram positive and negative organisms (ILG 1, ILG 3)
22. Compare the different of microscopes used in diagnostic labs (Light, fluorescent, electron) (ILG 3)
23. Distinguish between traditional (phenotypic) and molecular (genotypic) identification methods (ILG 1, ILG 3)
24. Explain common immunological and serological techniques used in infectious agent identification (ILG 1, ILG 3)
25. List the microorganisms usually associated with septicemia. (ILG 1, ILG 3)
26. Witness the proper collection of blood cultures using proper technique. (ILG 3)
27. List the microorganisms most frequently associated with bacterial and viral meningitis. (ILG 1, ILG 3)
28. Discuss the collection of cerebrospinal fluid as it pertains to the gross examination, gram staining, primary plating and identification of any pathogens. (ILG 1, ILG 3)
29. Compare throat cultures and sputum samples and identify commonly isolated normal flora and pathogens from each. (ILG 1, ILG 3)
30. Describe the proper urine collection technique used for microbiology specimens. (ILG 1, ILG 3)
31. List microorganisms most frequently associated with urinary tract infections. (GC A, GG 1, 3)
32. Understand how stool samples are processed and screened for pathogens in the microbiology lab. (ILG 3)
33. Name the sexually transmitted diseases and indicate the etiologic agent for each..(ILG 1, ILG 3)
34. List the major pathogens associated with wound or abscess infections. (ILG 1, ILG 3)
35. Briefly discuss infections of the normally sterile body fluids, the eye and the ear. (ILG 1, ILG 3)

Lab Performance (psychomotor) objectives:
1. Exercise safety practices during laboratory sessions. (ILG 3)
2. Fill in daily 'Preventative Maintenance' chart and record any necessary trouble shooting (ILG 1)
3. Follow specimen collection protocols for attaining various clinical laboratory specimens. (ILG 3)
4. Set up cultures from various sources using different media and streaking techniques. (ILG 3)
5. Streak agar plates qualitatively and quantitatively for isolated colonies. (ILG 3)
6. Place cultures in the appropriate atmospheric conditions for optimal growth of pathogens (ILG 3)
7. Properly store specimens for further testing (ILG 3)
8. Properly operate and perform maintenance on a light microscope (ILG 3)
9. Determine and record the morphology of bacterial colonies grown on agar (ILG1, ILG 3)
10. Apply the use of proper Gram staining technique. Determine the staining characteristics of gram positive and gram negative bacteria (ILG 3, ILG 11)

Week 2   *Staphylococcus* **species***, Streptococcus* **species**
       Antimicrobial Susceptibility and Molecular Methods for Identification
       [Supports Course SLOs #1-6]
Upon completion of this unit the student will be able to:
   Learning objectives:
1. Differentiate the phenotypic characteristics of *Staphylococcus* and *Micrococcus spp*. (ILG 3)
2. Explain the principles of the conventional tests used to identify *Staphylococcu*s spp. : Catalase, coagulase slide & tube, StaphaurexTM   (ILG 1, ILG 3)
3. Describe the 2 different mechanisms that result in resistant strains of Staph (ILG 1, ILG 3)
4. Explain the 'D test' and the implications of a positive test (ILG 1, ILG 3)
5. List the species of Streptococcus that are considered 1) Alpha hemolytic, 2) Beta hemolytic and 3) Gamma (non) hemolytic (ILG 1, ILG 3)

6. Name some of the conventional biochemicals and immunological tests used to identify Strep species (ILG 1, ILG 3)
7. Explain the laboratory method for isolating and identifying nutritionally variant Strep (ILG 1, ILG 3)
8. List the classes of antimicrobials and their mode of action (ILG 1, ILG 3)
9. Differentiate between: antimicrobial and antibiotic; synergy and antagonism; sensitive, intermediate and resistant; bactericidal and bacteriostatic (ILG 3)
10. Explain 5 different mechanisms of antimicrobial resistance (ILG 1, ILG 3)
11. Discuss the procedures and test result interpretations for manual, automated and molecular methods used for susceptibility and resistance testing (ILG 1, ILG 3)

Lab Performance (psychomotor) objectives:
1. Review normal flora and pathogens located within the respiratory tract(ILG11)
2. Prepare a throat culture specimen (ILG3) and workup the growth using biochemical testing (ILG3)
3. Identify gram positive unknowns using gram staining, biochemical and immunological techniques (ILG 3)
4. Demonstrate how automated systems are used for the susceptibility testing of pathogenic bacteria (ILG 3, ILG 11)

Week 4 **Enterobacteriaceae**
Nonfermentative Gram-Negative Bacilli
[Supports Course SLOs #1-6]
Upon completion of this unit the student will be able to:
Learning objectives
1. Describe the phenotypic traits that characterize the Enterobacteriaceae family. Differentiate between pathogenic and normal fecal flora in this family (ILG 1, ILG 3)
2. List the selective and differential agars used in isolating gram negative rods (ILG 1, ILG 3)
3. Explain the clinical significance of E.coli O157:H7 (ILG 1, ILG 3)
4. Define ESBL, KPC and MDR isolates (ILG 1, ILG 3)
5. Explain how to set up and interpret a 'Modified Hodge Test' (ILG 1, ILG 3)
6. Describe the phenotypic characteristics and clinical significance of the gram negative nonfermenters: *Acinetobacter, Bordetella, Burkholderia, Pseudomonas, Stenotrophomonas, Ralstonia, Chrysemonas and Flavimonas* (ILG 1, ILG 3)
7. Outline the normal habitat and general characteristics of the following gram negative rods (*Achromobacter, Alcaligenes, Comamonas, Flavobacterium, Moraxella spp*.) (ILG 1, ILG 3)

Lab Performance (psychomotor) objectives:
1. Perform conventional biochemical testing on common gram negative pathogens (ILG 3)
2. Set up manual susceptibility tests using Kirby Bauer diffusion disks and E tests for aerobic and anaerobic microorganisms (ILG 3)
3. Interpret results of manual susceptibility tests (ILG 3, ILG 11)
4. Demonstrate how automated systems are used for the susceptibility testing of pathogenic bacteria (ILG 3, ILG 11)
5. Use biochemical profile testing to identify microorganisms (ILG 3)
6. Demonstrate how an automated system is used for identification of pathogenic bacteria (ILG 3, ILG 4)
7. Identify gram negative unknown using gram staining and biochemical profiling (ILG 3)

Week 5 *Vibrio, Aeromonas, Campylobacter* **and Similar Organisms**
Gram Positive Rods
[Supports Course SLOs #1-6]
Learning Objectives
Upon completion of this unit, the student will be able to:
1. Describe the colonial morphology of Vibrio spp. and specialized media used for isolation (ILG 1, ILG 3)
2. Explain the clinical significance *of Aeromonas, Chromobacterium and Sphingomonas spp*. (ILG 1, ILG 3)
3. Identify the key phenotypic characteristics and clinical significance of *Eikenella and Pasturella spp*. (ILG 3)
4. Identify the key phenotypic characteristics and clinical significance of *Actinobacillus, Kingella, Capnocytophaga and Cardiobacterium spp*. (ILG 3)
5. Name the natural habitat and clinical significance of *Bacillus anthracis, B. cereus and B.subtilis* (ILG 1, ILG 3)
6. Differential between pathogenic and nonpathogenic strains of *Corynebacterium* (ILG 3)
7. Describe how Listeria infections are spread and which laboratory methods are used to identify it (ILG 1, ILG 3)
8. List the disease states associated with *Erysipelothrix, Gardnerella and Lactobacillus spp*. (ILG 1, ILG 3)

Lab Performance (psychomotor) objectives:
1. Employ the proper techniques for cultivating and identifying Campylobacter in the laboratory. (ILG 3)
2. Identify gram positive rods using gram staining, biochemical and immunological techniques (ILG 3)

Week 7 Haemophilus, HACEK, Legionella, Bordetella, Other Fastidious Gram-Negative Bacilli *Neisseria* species, Mycobacteria and Anaerobes
[Supports Course SLOs #1-6]

Upon completion of this unit the student will be able to:

Learning Objectives

Upon completion of this unit the student will be able to:
1. Detail the clinical symptoms seen in infections with Haemophilus spp.: H.*influenzae, H.parainfluenzae, H.ducreyi, H.aegyptius, H.hemolyticus, H.parahemolyticus* (ILG 1, ILG 3, ILG 10)
2. Describe the unique growth requirements needed to cultivate members of *Haemophilus* spp. (ILG 1, ILG 3)
3. List the clinical symptoms resulting from an infection with *Neisseria gonorrhoeae, N.meningitides and Moraxella catarrhali*s (ILG 1, ILG 3)
4. Describe growth requirements for cultivating Neisseria spp. and Moraxella catarrhalis (ILG 1, ILG 3)
5. Explain how *Haemophilus, Neisseria and Moraxella catarrhalis* can be definitively identified in the lab (ILG 1, ILG 3)
6. Discuss the various habitat for *Bartonella* spp. (ILG 1, ILG 3)
7. Describe the pathogenesis, identification methods and treatment of *Helicobacter pylori* (ILG 1, ILG 3)
8. List the pathogenic species of *Campylobacter* and explain how it is identified in the lab. (ILG 1, ILG 3)
9. Identify the causative agent of Legionnaire's disease and diagnostic methods (ILG 3)
10. Discuss the various habitats for Brucella spp. and the clinical symptoms caused by infection with these organisms (ILG 1, ILG 3)
11. Name the causative agent of whooping cough and tularemia. Explain the lab methods used to identify these infectious agents (ILG 1, ILG 3)
12. Give an overview of methods used to cultivate and identify anaerobic bacteria (ILG 3)
13. List pathogenic anaerobes and explain their (ILG 1, ILG 3)
14. Explain how Mycobacteria differ from other classes of bacteria in terms of composition, staining characteristics, cultivation and identification (ILG 1, ILG 3)
15. Explain when it is necessary to do susceptibility testing on Mycobacterium spp. (ILG 1, ILG 3)
16. Define and differentiate among facultative and obligate anaerobes (ILG 1, ILG 3)
17. Identify three anaerobe that are normal flora of the body and identify the site(s) of each. (ILG 1, ILG 3).
18. State the purpose of the different types of anerobic media utilized ILG 1, ILG 3).
19. Site the clinical relevance and important characteristics of the following gram-negative bacilli: *Bacteroides fragilis, Prevotella intermedius, Porphyromorias asaccharolyticus, Fusobacterium spp, Clostridium spp.* (ILG 3).

Lab Performance (psychomotor) objectives:
1. Study the process of collecting aerobic and anaerobic blood culture bottles needed for microbiological workup (ILG3)
2. Identify common pathogens that may be isolated and cause disease within the bloodstream (ILG1, ILG3)
3. Prepare or view smears for microscopic identification of the Actinomycetes and Mycobacteria spp. using the modified acid fast and acid fast staining techniques. Observe the staining characteristics of each class of organisms (ILG 3)
4. Demonstrate cultivation techniques, biochemical tests and molecular assays used in the identification of the Actinomycetes and Mycobacteria spp. (ILG 3, ILG 4)

Week 8: Chlamydia, Mycoplasma, and Rickettsia, Spirochetes and Virology
[Supports Course SLOs #1-6]

At the completion of this week, the student will be able to:

Learning (cognitive) objectives:
1. State the distinguishing characteristics of the genus Chlamydia.
2. Describe the diseases and identification of:
    a. Chlamydia trachomatis
    b. Chlamydophila pneumoniae
    c. Chlamydophila psittaci

3. State the specific serovars of Chlamydia trachomatis that cause lymphogranuloma venereum (LGV) and nongonococcal urethritis.
4. Describe the life cycle of Chlamydia.
5. List the important characteristics of the genus Mycoplasma.
6. Discuss the infectious diseases associated with Mycoplasma pneumoniae.
7. Explain how M. pneumoniae infection is diagnosed.
8. Describe the structure of a 'virion' (ILG 1, ILG 3)
9. Explain the steps of viral pathogenesis (ILG 1, ILG 3)
10. Give an overview of specimen collection for viral cultures (ILG 3)
11. Outline the traditional and modern ways of identifying viruses: cell culture, shell vial, hemadsorption, Tzanck smear, immunological, serological and molecular methods (ILG 1, ILG 3)
12. List the viral families and give an example of a virus found in each (ILG 1, ILG 3)
13. Explain how viral susceptibility testing differs from bacterial (ILG 1, ILG 3)
14. Name the commonly used antiviral agents (ILG 1, ILG 3)
15. Give examples of pathogens seen in the following organ infections: blood, upper and lower respiratory, oral cavity, CNS, eyes, ears, sinuses, urinary and genital tract, gastrointestinal tract, wound infections, sterile body fluids and bone (ILG 1, ILG 3, ILG 10)

Lab Performance (psychomotor) objectives:
1. Identify Haemophilus, Neisseria, Moraxella catarrhalis and obligate anaerobic bacteria using gram staining and biochemical profiling (ILG 3)
2. Identify cultures of Neisseria using gram stain morphology and the oxidase test.
3. Explain the purpose of chocolate agar, modified Thayer martin agar, and cystine trypticase agar for isolation and ID of the Neisseria and list any inhibitory agents:
4. Accurately perform and interpret quad plates with X and V factor and ß-lactamase (Cefinase) disc test.
5. Be able to interpret results from triple sugar iron slant, urease, decarboxylase, deaminase, and IMViC tests for enteric organisms(ILG3)
6. Determine the presence of WBCs within a stool specimen. (ILG3)
7. Correlate the possible diseases associated with the presence of WBCs in stool specimen. (ILG3)

Week 10: Mycology and Medical Parasitology (Protozoan Parasites & the Helminths)
[Supports Course SLOs #1-6]
At the completion of this week, the student will be able to:
Learning (cognitive) objectives:
1. Define the mycology terms: saprophytic, dimorph, telomorph, hyphae, chlamydospore, mycelium, phialides, conidia, sporangia and dematiaceous (ILG 1, ILG 3)
2. Describe the morphology, cultivation and test methods used to identify Spirochetes (ILG 1, ILG 3)
3. Differentiate between superficial, cutaneous, subcutaneous and systemic mycosis. Give an example of each (ILG 1, ILG 3)
4. List the media used in the cultivation of molds and yeast (ILG 1, ILG 3)
5. List the common dermatophytes and describe their pathogenesis (ILG 1, ILG 3)
6. Describe common antifungal agents and their mode of action (ILG 1, ILG 3)
7. Explain how molds and yeast are identified (ILG 1, ILG 3)
8. Name the different types of specimens collected for the identification of parasites (ILG 1, ILG 3)
9. Explain the life cycle and morphology of Plasmodium, Babesia, Trypanosoma and Leishmania spp. (ILG 1, ILG 3, ILG 10)
10. Describe the recent taxonomic changes made for Pneumocystis jiroveci (ILG 1, ILG 3)
11. Describe the best diagnostic method for identifying the following intestinal pathogens: Entamoeba, Endolimax. Iodamoeba, Blastocysitis, Giardia, Chilomastix, Dientamoeba, Balantidium, Cryptosporidium, Cyclospora, Isospora, Sarcocystis, Enterocytozoon and Encephalitozoon spp. (ILG 1, ILG 3)
12. Differentiate pathogenic microfilaria based on the presence of a sheath & tail nuclei (ILG 3, ILG 11)
13. Diagram the life cycle of Schistosomes and identify the eggs of the 5 different species (ILG 3)
14. List the parasites that can cause meningitis and encephalitis. (ILG 1, ILG 3)
15. Explain specimen collection requirements are for the isolation of Trichomonas vaginalis (ILG 1, ILG 3)
16. List the populations that are at risk for infections with Toxoplasma spp. (ILG 1, ILG 3)

17. Describe the life cycle and unique morphology of the intestinal nematodes: Ascaris, Enterobius, Strongyloides, Trichuris, Ancyclostoma and Necator spp. (ILG 1, ILG 3)
18. Identify the following structures of the parasitic Cestodes: scolex, suckers, proglottid and Rostellum (ILG 3)
19. Define 'hydatid cyst' (ILG 1, ILG 3)
20. Describe the life cycle of Taenia solium (pork tapeworm) (ILG 1, ILG 3)
21. Describe the unique morphology of the clinically significant intestinal, liver and lung Trematodes: Fasciolopsis, Clonorchis, Fasciola, Paragonimus spp.(ILG 1, ILG 3)

Lab Performance (psychomotor) objectives:
1. Perform, observe or discuss staining techniques used in the identification of molds and yeast. (ILG3)
2. Set up a germ tube and other biochemical tests for the identification of yeast. Interpret the test results using an online compendium (ILG 3)
3. Prepare or examine iodine or trichrome stained mounts for ova and parasites, describing your observations. Be able to use a Parasite Atlas to assist in identification features. (ILG 3)
4. Examine prepared Giemsa- or Wright-stained smears for the presence of blood parasites, including Plasmodium, Babesia, and Trypanosomes. Sketch your observations and label all significant findings (ILG3)

Week 11: Lecture Review Week and Final Lab Week [Supports Course SLOs #1-7]
Upon completion of this unit the student will be able to:
1. Give a presentation on a common infectious agent including clinical symptoms, laboratory diagnostics and treatment of the microbe [ILG 3, 9, 10, 11]
2. Recall and apply concepts from Weeks 1-9 in order to solve case study examples. (ILG 1, ILG 3, ILG 11)

Evaluation of student learning:
1. Lecture
a) Students will have weekly homework assignments through Blackboard LMS or via MediaLab Inc and must be completed to assess understanding of the theoretical concepts discussed in the lecture PowerPoints.
b) Students will complete a weekly quiz, bi-weekly exams and final assessment through Blackboard LMS or via MediaLab Inc.
c) Give a presentation on a common infectious agent including clinical symptoms, laboratory diagnostics and treatment of the microbe.

2. Lab
a) Students will complete weekly quizzes (pre-lab and/or post-lab) and complete weekly homework assignments that pertain to the laboratory exercises.
b) There will be written and hands-on practical assessments every couple of weeks throughout the course to assess competency level.
c) Students will work through case studies for patients with different etiologies and teach their fellow classmates.
d) Laboratory Session Professional Performance- Students' professional performances will be evaluated during each of the laboratory sessions and weekly feedback will be given on how to improve. The grading scale is for each of the categories below is that a student can score between 0-2 points (0= Unsatisfactory, 1=Satisfactory, 2=Exceeds Expectations).
   i) PROFESSIONAL PERFROMANCE EVALUATION:
       1. DEPENDABILITY
          - The student arrives in the laboratory with adequate time to start lab session as scheduled. The student comes with appropriate manual and supplies, and wearing required laboratory attire. The student shows evidence of having reviewed the assigned topic before coming to the laboratory. The student completes assignments (lab reports, homework assignments, etc) on time.
       2. ATTENTIVENESS
          - The student is attentive to the instructor, takes complete notes and proceeds with laboratory work without repeated instructions. The student follows verbal and written instructions, asks pertinent questions when necessary, and seeks the instructor's assistance when needed. The student neither distracts others nor allows distractions to affect completion of laboratory exercises.
       3. ORGANIZATION
          - The student demonstrates the ability to organize work to be done within the available laboratory time. The student is able to perform multiple tasks without jeopardizing accuracy and precision.

4. INDEPENDENCE
  - The student demonstrates the ability to work independently by exercising independent judgement and thinking logically in using the protocols and instructions given. The student draws on previously gained information to solve problems without prompting from instructor. The student seeks activities to expand knowledge, ability and performance.

5. RECORD KEEPING
  - The student demonstrates the importance or proper record keeping by accurately and legibly labeling/recording laboratory work and reports (i.e. sample containers, reagents and worksheets).

6. MANAGEMENT AND ECONOMY
  - The student conserves reagents and supplies. The student maintains an adequate supply of common use items at their appropriate workstation. The student takes proper care of equipment

7. SAFETY
  - The student works in an orderly and safe manner, enabling others to safely work in the same general area. The student adheres to the guidelines of the Laboratory Safety Regulations (e.g. wearing eye protection, keeping long hair tied back, and properly storing hazardous materials).

8. INTERPERSONAL SKILLS
  - The student communicates in a professional, positive, tactful manner with peers and instructors. The student consistently shows common courtesy (e.e. restocks supplies) and contributes towards achieving an environment conducive to work and learning for self and others.

9. Composure
  - The student maintains composure and work quality under stressful conditions and adapts quickly to new situations. The student recognizes his/her own personal strengths and weaknesses and works positively within that framework. The student accepts evaluation of performance as constructive when offered by instructors and follows through with suggestions made.

10. INTEGRITY
  - The student accepts accountability for work performed. The student readily admits errors, follows procedures (including quality control) as written, and maintains confidentiality of patient results, if applicable. Student exhibits perseverance to obtain accurate results

Course Grading

A	93-100%	B-	80-82
A-	90-92	**C+**	**77-79 <- minimum grade needed for total course grade**
B+	87-89	**C**	**70-76 <- minimum grade needed in Laboratory**
B	83-86	D	60-69
F	0-59%		

Lecture (50% of total grade)
Presentation   5%
Assignments   10%
Quizzes   10%
Exams   10%
Final   <u>15%</u>
              ____% x .50 = _____ Lecture Percentage

Laboratory (45% of total grade)
SOPs/ Assignments   10%
Lab Practicals   10%
Quizzes/Pre-Labs   10%
Final (questins/unknown) <u>15%</u>
              % x .40 = _____ Lab Percentage

Professionalism (Affective) 5% of totale grade
Attendance   _____/1000 points possible (100% for presence, 50% if tardy, & 0% if absent for each week)
Professionalism*   _____/100 points
                        _____/880 = x .05 = _____ **Affective Percentage**

_____Final Total Grade= Lecture Percentage + Lab Percentage + Professionalism