

MERCER COUNTY COMMUNITY COLLEGE

COURSE OUTLINE

MLT 205  
Course Number

6  
Credits

Diagnostic Microbiology  
Course Title

5  
Class Hours

Science and Allied Health  
Division

3  
Laboratory Hours

Texts: Title: Textbook of Diagnostic Microbiology 2<sup>nd</sup> edition  
Author: Mahon and Manuselis  
Publisher: Harcourt Brace & Co.

Methods of Instruction: Lecture, discussion, audio-visual media and college laboratory

Methods of Evaluation: Assignments, quizzes, examinations and college laboratory performances

7 ½ Weeks  
Length of Semester

Instructor: Jane O'Reilly, MS 145  
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2004

Catalog Description**MLT 205 - Diagnostic Microbiology****6 credits**

Prerequisite: MLT 200

Principles and methods used in clinical microbiology including isolation, identification and antibody sensitivity testing of pathogenic bacteria. Introduction to medical parasitology, mycology and virology. Clinical includes analysis of laboratory case studies correlating test results with clinical significance.

5 lecture/3 laboratory hours

Suggested Additional References

- Blair, Lennette, Truant: Manual of Clinical Microbiology, American Society for Microbiology
- Bailey & Scotts: Diagnostic Microbiology
- Henry: Clinical Diagnosis and Management by Laboratory Methods, Saunders
- Bartelt: Diagnostic Bacteriology: A Study Guide
- Koneman: Color Atlas and Textbook of Diagnostic Microbiology

Grading Policy

1. To receive an acceptable passing grade, the student must meet the following criteria:

- a. Achieve the following minimum number of points in each section of the course:

Minimum lecture points	420
Minimum laboratory points	140

The final grade will not be computed unless the minimum points are achieved in each portion of the course that is, the lecture portion, and the laboratory portion.

- b. Attendance is mandatory for all lecture and laboratory sessions. More than 2 missed labs will result in failure for the course.

2. A final grade of “C” or better in each Medical Laboratory Technician course is necessary to progress to the next MLT course and to graduate. (No “D” grades are given in MLT courses.)
3. If any part of the course, that is, the lecture part, or the laboratory part is failed, the student must repeat the entire course.
4. If the student receives the minimum number of points in each section of the course listed in “a” above (the lecture or the laboratory) then the final grade is computed as follows:

total lecture points  
plus total laboratory points = Final Grade

5. Final Grade

A grade = 800 – 720 points  
B grade = 719 – 640 points  
C grade = 639 – 560 points  
F grade = less than 560 points

Grade points are computed as follows:

Total Lecture Points

(4) Hour tests	=	400 pts. maximum
Weekly quizzes averaged	=	100 pts. maximum
Final exam score	=	<u>100</u> pts. maximum
Lecture Total		600 pts. maximum

Total Laboratory Points

(2) mini lab practicals (50 pts. each)	=	100 pts. maximum
Evaluation of specimens lab practical	=	100 pts. maximum
Laboratory Total		200 pts. maximum

**Academic Integrity Policy:**

Any student who (1) knowingly represents the work of others as his/her own, (2) uses or obtains unauthorized assistance in the execution of any academic work, and (3) gives fraudulent assistance to another, is guilty of cheating. Violators will be penalized with established college policies and procedures.

## General Course Objectives

### MLT 205

The student will be able to:

1. Explain the precautions used in the microbiology lab to minimize hazards.
2. Describe the proper collection of all types of specimens for culture.
3. Demonstrate proper technique for culturing routine specimens.
4. Recognize specialized and routine media, identifying specific reactions on each type.
5. Prepare and read gram stains and other specialized stains (AFB).
6. Set up and read antibiotic sensitivity plates.
7. List normal and abnormal organisms found in routine specimens.
8. Explain the relationship of specific bacteria to specific diseases.
9. Identify bacteria on the basis of morphology, staining characteristics, cultural characteristics, biochemical and serological tests.
10. Identify and recognize parasites of medical importance to man.
11. Explain the principle and procedure for the collection, preservation, concentration, flotation, and staining techniques used in the laboratory for the identification of protozoa and helminths.
12. Identify the morphology and describe the methods for identifying yeast.
13. Describe the morphology of the superficial dermatophytes, subcutaneous, systemic and opportunistic fungi that can infect man.

## LABORATORY - EXIT LEVEL SKILLS

### OBJECTIVES

1. Demonstrates proper technique and knowledge in the isolation and identification of bacteria.
  - a. Given unknown bacterial organisms the student will isolate and describe the following characteristics of each:
    1. Gram stain reaction
    2. Morphology
    3. Cultural appearance on media
    4. Biochemical test results
  - b. Based on these characteristics, the student will evaluate clinical specimens, recognize normal flora, recognize pathogens, and state the appropriate follow-up procedures for pathogen isolation and identification.
2. Demonstrate ability to perform, interpret and report an antimicrobial sensitivity test using the Kirby Bauer technique.

MLT 205

## MICROBIOLOGY LECTURE SCHEDULE

WEEK 1 -	T W R	Overview of Microbiology/Bacterial Morphology Microbiology Stains and Media Staphylococcus
WEEK 2 -	T W R	Streptococcus Respiratory Cultures, Genital and Blood Cultures Neisseriaceae and Branhamella
WEEK 3 -	T W R	TEST #1/Enterobacteriaceae Enterobacteriaceae GI Infections and UTI
WEEK 4 -	T W R	TEST #2/Antimicrobial Susceptibility Testing Non fermenters Aerobic Gram Positive Bacilli
WEEK 5 -	T W R	Fastidious Gram Negative Rods Anaerobic Systems and Anaerobes Wound Infections
WEEK 6 -	T W R	TEST #3/Parasitology Specimens and Techniques Protozoa Helminths
WEEK 7 -	T W R	TEST #4/Mycobacteria Mycobac Teria Mycology Specimens and Techniques
WEEK 7½	T R	Mycology – Yeast - Fungi Final Exam

MLT 205

## MICROBIOLOGY LAB SCHEDULE

WEEK 1	T	Gram Stains and Direct Smears
	W	Media
	R	Staph
	F	Staph
WEEK 2	T	Strep
	W	Strep/Respiratory Cultures
	R	Neisseria
	F	Neisseria
WEEK 3	T	Mini-practical #1/set up traditional gm -
	W	Traditional gm -
	R	API
	F	API
WEEK 4	T	gm-serotyping
	W	Pseudomonas/culture evaluations
	R	Culture evaluations
	F	Mini practical #2
WEEK 5	T	Haemophilus
	W	Culture evaluations
	R	Anaerobes/culture evaluations
	F	Culture evaluations
WEEK 6	T	Culture evaluations
	W	Culture evaluations
	R	Culture/unknown evaluations practical
	F	Culture/unknown evaluations practical
WEEK 7	T	Parasitology
	W	Parasitology
	R	Mycology
	F	Mycology

## MLT 205 Diagnostic Microbiology

**WEEK 1**

<b>KNOWLEDGE OBJECTIVES</b>	<b>CONTENT OUTLINE</b>	<b>PERFORMANCE OBJECTIVES</b>
<ol style="list-style-type: none"> <li>1. Describe 5 precautions taken in a microbiology lab to minimize results.</li> <li>2. Explains types of collection container needed for specific area or fluid to be cultured.</li> <li>3. Names 5 necessary pre-requisites to proper collection of specimens.</li> <li>4. Explains the proper shipment of specimens for culture of viruses, bacteria and fungi.</li> <li>5. Defines sterilization and explains the methods used for specific cases.</li> <li>6. Describe the role of normal flora as a host defense against pathogenicity.</li> <li>7. Describe the host resistant factor involved in immunity to disease.</li> <li>8. State 5 routes of transmission of disease.</li> <li>9. Define ATCC and the role of Q.C. as part of a quality assurance.</li> </ol>	<p><b>Microbial Concepts</b> Koch's postulate Taxonomy Characteristics of species</p> <p><b>Basic Concepts of Infectious Disease</b> Infection Routes of infection Host Resistance</p> <p><b>Specimen Processing</b> Collection Culture ID AST testing</p> <p><b>Sterilization</b> Methods Decontamination</p> <p><b>Micro Lab Safety</b> <b>Infection Control</b></p>	<ol style="list-style-type: none"> <li>1. Review MLT micro lab safety policies.</li> <li>2. <u>Computer Assisted Instruction</u> Review program "Gram Stain Tutor"</li> <li>3. Prepare gram stains of known isolates.</li> <li>4. Observe the operation of the autoclave.</li> </ol>

**Assignment:** Mahon: Chapters 2, 6, 7

## MLT 205 Diagnostic Microbiology

**WEEK 1**

<b>KNOWLEDGE OBJECTIVES</b>	<b>CONTENT OUTLINE</b>	<b>PERFORMANCE OBJECTIVES</b>
<ol style="list-style-type: none"> <li>1. Explains the purpose of staining bacteria.</li> <li>2. Defines differential staining, primary stain, decolorizer, mordant and counter stain.</li> <li>3. For each stain listed in the outline give the principle, components and interpretation of the results.</li> <li>4. Explain the procedure for preparing direct smears from specimens.</li> <li>5. State the significance of performance of direct smears and relate the evaluation to acceptance/rejection of samples.</li> </ol>	<p><b>Stains</b></p> <ol style="list-style-type: none"> <li>1. Purpose and principle</li> <li>2. Types of stains</li> <li>3. Special stains               <ol style="list-style-type: none"> <li>a. Gram stain                   <ol style="list-style-type: none"> <li>1. principle</li> <li>2. components</li> <li>3. results</li> </ol> </li> <li>b. Acid fast stain                   <ol style="list-style-type: none"> <li>1. principle</li> <li>2. components</li> <li>3. results</li> </ol> </li> <li>c. Capsule                   <ol style="list-style-type: none"> <li>1. India ink</li> </ol> </li> <li>d. Metachromatic granules                   <ol style="list-style-type: none"> <li>1. Methylene blue</li> <li>2. Alberts</li> </ol> </li> <li>e. Flagellar stain                   <ol style="list-style-type: none"> <li>1. Leifsohn</li> </ol> </li> </ol> </li> </ol>	<ol style="list-style-type: none"> <li>1. Perform the gram stain procedure on material from liquid and solid media.</li> <li>2. Observe and record the gram stain morphology of the materials prepared.</li> <li>3. Observe and interpret prepared gram stains from direct smears.</li> <li>4. Evaluate direct smear preparations.</li> <li>5. Identifies possible errors in the staining process.</li> </ol>

**Assignment:** Mahon: Chapters 8, 1

MLT 205 Diagnostic Microbiology  
WEEK 1

KNOWLEDGE OBJECTIVES	CONTENT OUTLINE	PERFORMANCE OBJECTIVES
<ol style="list-style-type: none"> <li>1. Explains the purpose of each culturing technique listed in the outline.</li> <li>2. Draws the normal bacterial growth curve and explain what occurs during each phase.</li> <li>3. Using a specified organism gives its requirements for growth.</li> <li>4. Names the type of media used for routine culture of a specific specimen in most hospital laboratories.</li> <li>5. Explains the methods of preparation and storage of media. Use a specific example.</li> <li>6. Explains the quality control methods used for media.</li> <li>7. Define differential selective and enrichment media.</li> <li>8. Given a specific medium, indicates the purpose of each constituent.</li> </ol>	<p><b>Bacterial Growth Characteristics</b> Growth curve Environmental conditions</p> <p><b>Culture Methods</b> Technique a. streak plate b. isolation plate c. pour plate</p> <p><b>Growth Curve</b> Requirements for growth</p> <p><b>Culturing Specimens</b> a. routine media b. special specimens</p> <p><b>Culture Media</b> a. preparation b. storage</p> <p><b>Types of Media</b> a. differential b. selective c. enrichment</p> <p><b>Constituents of Media</b> a. nutrients b. indicators c. inhibitors</p> <p><b>Quality Control of Media</b> a. evaluation</p> <p><b>Conventional ID Systems</b> <b>Rapid ID Systems</b> <b>Molecular ID Systems</b></p>	<ol style="list-style-type: none"> <li>1. Prepares media specified by the instructor according to directions. Sterilize it and pour the plates.</li> <li>2. Given a specimen, chooses the proper media from each category as follows: differential selective</li> <li>3. Inoculates each special medium correctly.</li> <li>4. Identifies a reaction in each special medium it interprets in proper manner.</li> <li>5. Inoculates quality control plates or biochemical tests to incubate with unknown specimens.</li> <li>6. Demonstrates correct method for streaking plate.</li> <li>7. Uses isolation technique to obtain a pure culture of a specified organism.</li> </ol>

**Assignment:** Mahon: Chapter 9 and reference Appendix A Chapter 1 (pg 13-14), Chapter 4

**WEEK 1**

<b>KNOWLEDGE OBJECTIVES</b>	<b>CONTENT OUTLINE</b>	<b>PERFORMANCE OBJECTIVES</b>
<ol style="list-style-type: none"> <li>1. Give the general characteristics of the genus Staph.</li> <li>2. Differentiate between Staph and other micrococcaceae.</li> <li>3. Describe the virulence factors associated with Staphylococcus.</li> <li>4. Describe the clinical infections associated with Staph.</li> <li>5. Name the differentiated tests that are used to identify Staph aureus, Staph epid, Staph saprophyticus.</li> </ol>	<p><b>Micrococcaceae</b> genus <b>General Characteristics</b> <b>Staphylococcus</b> species <b>Micrococcus</b> species <b>Biochemicals</b> <b>Clinical Correlations</b> pathogenicity factors common disease <b>ID Systems</b> MRSA stains VRSA stains</p>	<ol style="list-style-type: none"> <li>1. Record the results of the Staph cultures used for demonstration.</li> <li>2. Observe the procedures for performing: catalase, Staphaurex, tube coagulase, Novobiocin susceptibility, and and Beta lactamase testing.</li> <li>3. Given an unknown, correctly identify the species of Staph. Inoculate the unknown to BA adding a Novobiocin disk, and incubating at 35 overnight.</li> <li>4. Using a scheme for Staph ID, identify your unknown.</li> <li>5. Evaluate the lab results of MRSA and Beta-lactamase testing.</li> </ol>

**Assignment:** Mahon: Chapter 10

## MLT 205 Diagnostic Microbiology

**WEEK 2**

<b>KNOWLEDGE OBJECTIVES</b>	<b>CONTENT OUTLINE</b>	<b>PERFORMANCE OBJECTIVES</b>
<ol style="list-style-type: none"> <li>1. State the cell morphology and staining of Strep.</li> <li>2. Discuss the cultural characteristics.</li> <li>3. List the important species.</li> <li>4. Discuss special isolation techniques for Strep.</li> <li>5. State the identification tests used to identify Strep.</li> <li>6. List the normal flora associated with cultures of the throat, nasal, sputum, eyes and ears.</li> <li>7. Associate common known pathogens that cause disease at each site cultured in the upper and lower respiratory tract.</li> </ol>	<p><b>Streptococcacea</b> Genus General characteristics Hemolytic reactions Identification Clinical significance</p> <p><b>Pneumococcus</b> Infection Cultural characteristics Identification: lab</p> <p><b>Naso-pharyngeal, Throat, Sputum, Eyes, Ear Cultures</b> Normal flora Abnormal flora Method of culture Organisms associated with this area</p>	<ol style="list-style-type: none"> <li>1. Observe and record results of the demonstration of the Streptococci.</li> <li>2. Compare the catalase test on Staphylococci and Streptococci.</li> <li>3. Describe the appearance of Beta, Alpha, and Gamma hemolysis on BA and compare this hemolysis on CNA and CA.</li> <li>4. Discuss differentiation of: Strep veridans vs. Strep pneumoniae Strep pyogenes vs. Strep agalactiae Strep faecalis vs. Strep bovis.</li> <li>5. Perform and evaluate your own throat culture.</li> <li>6. Develop a flow-chart for ID of Streptococci.</li> </ol>

**Assignment:** Mahon: Chapter 11 and Chapter 26

## MLT 205 Diagnostic Microbiology

**WEEK 2**

<b>KNOWLEDGE OBJECTIVES</b>	<b>CONTENT OUTLINE</b>	<b>PERFORMANCE OBJECTIVES</b>
<ol style="list-style-type: none"> <li>1. For each Neisseria pathogen list the:               <ol style="list-style-type: none"> <li>a. cell morphology and staining</li> <li>b. cultural characteristics</li> <li>c. important species</li> <li>d. special isolation</li> <li>e. identification tests</li> <li>f. pathogenicity</li> </ol> </li> <li>2. List the normal flora found in vaginal and urethral cultures.</li> <li>3. Identify the common abnormal organisms associated with disease in genital cultures.</li> <li>4. Discuss the significance of culturing Moraxella in a sputum culture.</li> </ol>	<p><b>Neisseria</b></p> <ul style="list-style-type: none"> <li>Genus</li> <li>Characteristics</li> <li>Biochemicals</li> <li>ID systems</li> </ul> <p><b>Pathogens</b></p> <ul style="list-style-type: none"> <li>Neisseria meningitidis</li> <li>Neisseria gonorrhoeae</li> </ul> <p><b>Moraxella catarrhalis</b></p> <p><b>Blood cultures</b></p> <ul style="list-style-type: none"> <li>Procedure</li> <li>Systems</li> <li>Pathogens</li> </ul> <p><b>Genital cultures</b></p> <ul style="list-style-type: none"> <li>Normal flora</li> <li>Abnormal flora</li> <li>Methods of culture</li> <li>Organisms associated with this area               <ol style="list-style-type: none"> <li>a. Neisseria</li> <li>b. Other organisms</li> </ol> </li> </ul>	<ol style="list-style-type: none"> <li>1. Observe and record results of the Neisseria and Moraxella demonstration.</li> <li>2. Perform cytochrome oxidase and catalase on Neisseria and Moraxella.</li> <li>3. Given an unknown, perform gram stain and biochemical tests for identification.</li> <li>4. Evaluate your throat culture.</li> <li>5. Observe culture results from GC cultures and other genital cultures.</li> </ol>

**Assignment:** Mahon: Chapter 14, Chapter 32, Chapter 30

## MLT 205 Diagnostic Microbiology

**WEEK 3**

<b>KNOWLEDGE OBJECTIVES</b>	<b>CONTENT OUTLINE</b>	<b>PERFORMANCE OBJECTIVES</b>
<ol style="list-style-type: none"> <li>1. Give the general characteristics of organisms that belong to the family Enterobacteriaceae.</li> <li>2. State the organism's characteristic growth on nonselective and selective differential media.</li> <li>3. Describe the reactions involved and the products of metabolism tested in in each of the biochemicals as listed in the content outline.</li> <li>4. Given the key reactions, identify an unknown into its tribe and genus.</li> <li>5. Given unknowns, identify genus and species by traditional and API systems.</li> <li>6. Discuss the Vitek and Microscan systems of ID.</li> </ol> <p>unknowns</p>	<p><b>Enterobacteriaceae</b></p> <ul style="list-style-type: none"> <li>Tribes</li> <li>Genus</li> <li>General characteristics</li> <li>Classification</li> <li>Virulence factors</li> <li>Media - selective</li> </ul> <p><b>Traditional Biochemical Tests</b></p> <ul style="list-style-type: none"> <li>TSI, LIA, citrate, Indoli, M-R, V-P, PDA, urea, DNA</li> </ul> <p><b>Methods of Identification</b></p> <ul style="list-style-type: none"> <li>Traditional</li> <li>Microsystems</li> <li>Automated</li> </ul>	<ol style="list-style-type: none"> <li>1. Perform a mini-practical exam.</li> <li>2. Observe and record results of the demonstration of the traditional biochemical patterns for E. coli, Shigella, Salmonella, Klebsiella, Enterobacter, Proteus.</li> <li>3. Observe the demonstration for inoculation of the traditional biochemicals of TSI, PAD, I, MR, VP, Citrate, Urea, Motility.</li> <li>4. Observe the demonstration for the inoculation of the API system.</li> <li>5. Inoculate gram negative to traditional and API systems.</li> </ol>

**Assignment:** Mahon: Chapter 16, Chapter 5, pg. 184-186, 188-190.

**WEEK 3**

<b>KNOWLEDGE OBJECTIVES</b>	<b>CONTENT OUTLINE</b>	<b>PERFORMANCE OBJECTIVES</b>
<ol style="list-style-type: none"> <li>1. Recognize the significance of serologic testing for epidemiology study.</li> <li>2. Explain the role of normal flora in the GI tract.</li> <li>3. Explain the pathogenic mechanism involved in acute bacterial diarrhea.</li> <li>4. List 6 common infectious agents that can cause diarrhea.</li> <li>5. Create a flowchart that would be used to schematically identify GI pathogens.</li> </ol>	<p><b>Serological Identification</b> O-H-K antigens Traditional serotyping Wellcolex serotyping</p> <p><b>Gastrointestinal Infections</b> Normal flora Abnormal flora E. coli 0157:H7 Salmonella Shigella Yersinia C. difficile Campylobacter</p> <p><b>Lab Diagnosis: GI Pathogens</b> Direct smear Culture Serology</p>	<ol style="list-style-type: none"> <li>1. The student will identify an unknown specimen and use this specimen for serotyping procedures.</li> <li>2. Observe and record results of the demonstration of Wellcolex Shigella and Salmonella serotyping.</li> <li>3. As partners, perform a Shigella and Salmonella serotyping procedure.</li> </ol>

**Assignment:** Mahon: Chapters 16 and 17, Chapter 28

## MLT 205 Diagnostic Microbiology

**WEEK 3**

<b>KNOWLEDGE OBJECTIVES</b>	<b>CONTENT OUTLINE</b>	<b>PERFORMANCE OBJECTIVES</b>
<ol style="list-style-type: none"> <li>1. Define the terms associated with UTI.</li> <li>2. Describe the appropriate samples for culture and interpretation of results based on type of sample submitted.</li> <li>3. List 6 organisms commonly associated with UTI.</li> <li>4. Compare conventional and rapid screen test methods for UTI.</li> </ol>	<p><b>Urinary Tract Infections</b></p> <ul style="list-style-type: none"> <li>Clinical signs</li> <li>Types of disease</li> <li>Common pathogens</li> </ul> <p><b>Lab Diagnosis UTI</b></p> <ul style="list-style-type: none"> <li>Collection</li> <li>Colony count</li> <li>Specimen rejection</li> </ul> <p><b>Methods of Analysis</b></p> <ul style="list-style-type: none"> <li>Traditional</li> <li>Rapid screen</li> </ul>	<ol style="list-style-type: none"> <li>1. Perform a urine culture by colony count technique.</li> </ol>

**Assignment:** Mahon: Chapter 31

## MLT 205 Diagnostic Microbiology

**WEEK 4**

<b>KNOWLEDGE OBJECTIVES</b>	<b>CONTENT OUTLINE</b>	<b>PERFORMANCE OBJECTIVES</b>
<ol style="list-style-type: none"> <li>1. Give 4 modes of action of antibiotics and give an example of each.</li> <li>2. Explain what is meant by “drug resistance.” Give examples.</li> <li>3. Explain 2 procedures for performing antibiotic sensitivity tests.</li> <li>4. Compare disc and tube dilution methods with reference to accuracy, speed, ease of performance and cost.</li> <li>5. Explain theory of Kirby-Bauer method.</li> <li>6. Discuss the method of performing, reading and possible sources of error in the Kirby-Bauer method.</li> <li>7. Explain correlation of tube and Kirby-Bauer methods with reference to blood levels.</li> <li>8. Explain the principle of E test.</li> <li>9. Discuss Q.C. procedures in antimicrobial testing.</li> </ol>	<p><b>Antibiotics and Chemical Agents</b></p> <ol style="list-style-type: none"> <li>1. Mode of action of specific antimicrobial drugs</li> <li>2. Common antibiotics and their use               <ol style="list-style-type: none"> <li>a. against gram positive organisms</li> <li>b. against gram negative organisms</li> <li>c. broad spectrum</li> <li>d. special use</li> </ol> </li> <li>3. Drug resistance</li> </ol> <p><b>Antibiotic Sensitivity</b></p> <ol style="list-style-type: none"> <li>1. Methods               <ol style="list-style-type: none"> <li>a. tube dilution</li> <li>b. MIC</li> <li>c. Kirby-Bauer</li> <li>d. E test</li> </ol> </li> <li>2. Comparison of methods               <ol style="list-style-type: none"> <li>a. advantages of each</li> <li>b. disadvantages of each</li> </ol> </li> <li>3. Kirby-Bauer Method               <ol style="list-style-type: none"> <li>a. procedure</li> <li>b. reading</li> <li>c. sources of error</li> <li>d. quality control</li> </ol> </li> <li>4. MIC evaluation</li> </ol>	<ol style="list-style-type: none"> <li>1. Perform an AST by the Kirby Bauer disk diffusion method on Mueller Hinton agar.</li> <li>2. Interpret zone size results by NECLS standards and report the results as S.I.R.</li> <li>3. Evaluate MIC results performed by an automated method of broth dilution.</li> <li>4. Observe and interpret an E test.</li> </ol>

**Assignment:** Mahon: Chapter 3

MLT 205 Diagnostic Microbiology

**WEEK 4**

<b>KNOWLEDGE OBJECTIVES</b>	<b>CONTENT OUTLINE</b>	<b>PERFORMANCE OBJECTIVES</b>
<ol style="list-style-type: none"> <li>1. Describe the general characteristics of nonfermentative gram negative rods.</li> <li>2. Differentiate the metabolic pathways used by fermentative and non-fermentative organisms.</li> <li>3. Recognize the cell morphology and cultural characteristics that identify the organisms listed in the content outline.</li> </ol>	<p><b>General Characteristics of Non-Fermenters</b>            Biochemical pathways of metabolism                oxidation                fermentation            Biochemical ID systems</p> <p><b>Risk Factors for Clinical Infection</b>            immune state            trauma            foreign bodies            infusions</p> <p><b>Pseudomonas Aeruginosa</b>            infection</p> <p><b>Alcaligines</b>  <b>Flavobacter</b>  <b>Eikenella</b></p>	<ol style="list-style-type: none"> <li>1. Perform a gram stain and oxidase test on Pseudomonas and Xanthomonas.</li> <li>2. Inoculate a non-fermenter to TSI and a non-fermenter ID system. (Enterotube or API.)</li> <li>3. Perform a mini practical; set up 10 stations for identification and/or evaluation.</li> </ol>

**Assignment:** Mahon: Chapter 18

**WEEK 4**

<b>KNOWLEDGE OBJECTIVES</b>	<b>CONTENT OUTLINE</b>	<b>PERFORMANCE OBJECTIVES</b>
<ol style="list-style-type: none"> <li>1. Compare the gram stain morphology of Corynebacterium, Listeria and Bacillus.</li> <li>2. Characterize Listeria on BA, BE, and Motility.</li> <li>3. Describe the gram stain, cultural characteristics, and choice of media for isolation of Haemophilus influenza, Haemophilus paraenfluenzae and Gardnerella vaginalis.</li> <li>4. Differentiate Haemophilus species by X and V factor requirements and by the Rapid N/H method.</li> <li>5. Describe the satellite phenomenon.</li> </ol>	<p><b>Corynebacterium</b> general characteristics</p> <p><b>C. diphtheriae</b> clinical infection lab diagnosis diphtheroids</p> <p><b>Listeria</b> infection lab diagnosis</p> <p><b>Lactobacillus</b> smear and culture</p> <p><b>Bacillus</b> general characteristics B. anthrax B. subtilus</p> <p><b>Haemophilus</b> general characteristics X, V factors satellite</p> <p><b>Haemophilus influenzae</b> infection identification</p> <p><b>Haemophilus aegyptius</b> infection</p> <p><b>Gardnerella vaginalis</b> infection identification</p>	<ol style="list-style-type: none"> <li>1. Observe the colony morphology of Listeria on BA, compare growth to beta Strep group B.</li> <li>2. Gram stain and perform bio-chemicals (Bile Esculin, Motility), on Listeria.</li> <li>3. Observe a prepared gram stain of Corynebacterium, Listeria and bacillus and</li> <li>4. Given an Haemophilus unknown, isolate and identify the species by performing a gram stain, Haemophilus guard plate, and a Staph streak and the Rapid N/H system.</li> <li>5. Observe and record results of the lab demonstration of test and culture characteristics of Gardnerella.</li> </ol>

**Assignment:** Mahon: Chapters 12, 13 and 15

**WEEK 5**

<b>KNOWLEDGE OBJECTIVES</b>	<b>CONTENT OUTLINE</b>	<b>PERFORMANCE OBJECTIVES</b>
<ol style="list-style-type: none"> <li>1. Discuss the principle of the Gas-Pak and Bio-Bag ANA system.</li> <li>2. Explain and perform aerotolerance testing.</li> <li>3. Explain the purpose of the following media used to isolate anaerobic bacteria: ANA blood agar, thioglycollate broth, chopped meat broth, and anaerobic PEA agar.</li> <li>4. Describe the gram stain, broth and cultural growth characteristics of Clostridium perfringens, Clostridium sordelli, and Bacteroides ovatus.</li> <li>5. Identify unknown samples of an anaerobes.</li> <li>6. Review normal skin flora.</li> <li>7. List several pathogens commonly found in wound cultures.</li> </ol>	<p><b>Concepts:</b></p> <p><b>Anaerobic</b> infection obligate facultative normal flora risk factors clinical signs specimen collection transport systems media</p> <p><b>Anaerobic Pathogens</b> clostridium perfringens clostridium difficile bacteroides</p> <p><b>Aerotolerance</b></p> <p><b>Testing</b> principle</p> <p><b>Wound Cultures</b> normal skin flora common pathogens media, environment, ID</p>	<ol style="list-style-type: none"> <li>1. Observe and record results of the demonstration of clostridia and bacterioides.</li> <li>2. Perform, read, and interpret anaerobe isolation of an unknown using the rapid ANA II system and APIA system.</li> <li>3. Set up a gas pak anaerobic jar.</li> <li>4. Set up an anaerobic bio-bag.</li> <li>5. Evaluate wound cultures.</li> </ol>

**Assignment:** Mahon: Chapters 19, 27

## MLT 205 Diagnostic Microbiology

**WEEK 6**

<b>KNOWLEDGE OBJECTIVES</b>	<b>CONTENT OUTLINE</b>	<b>PERFORMANCE OBJECTIVES</b>
1. Parasitology: Identify techniques for handling, preservation, of various sources of specimens for parasitology examination. (fecal, duodenal, blood smears, CSF, urine, vaginal samples)	<b>Parasitology Terms</b>  <b>Fecal Sample</b> collection preservation <b>Lab Methods of Fecal Sample Examination</b> macroscopic microscopic	Demonstrate various kits, preservatives, concentration methods and wet mount preps for fecal exam.
2. Understand the procedure for cellophane tape prep, modified acid fast stain.	direct wet mount concentration permanent stain slides	Observe the use of an ocular neurometer and determine the size of parasite trophs, cysts and eggs.
3. Discuss the use of the the ocular micrometer in parasitology.	<b>Cellophane Tape Prep</b> pinworm  <b>Modified Acid Fast Stain</b> cryptospridum cyclospora  <b>Duodenal Aspirates</b> Giardia Strongyloides  <b>Signiordoscopy</b> amebiasis  <b>Urine, Vaginal</b> trichomonas pinworm  <b>Ocular Micrometer</b> purpose calibration	

## MLT 205 Diagnostic Microbiology

**WEEK 6**

<b>KNOWLEDGE OBJECTIVES</b>	<b>CONTENT OUTLINE</b>	<b>PERFORMANCE OBJECTIVES</b>
Discuss the protozoa.	<b>Protozoa</b>	Observe wet mount preparation, iron hematoxylin and tircrome stained slides of the protozoa.
Understand the epidimislogy, life cycle and clinical infections associated with the protozoa.	Subphylum: ameba flagellates ciliates sporozoa	
Be able to identify the troph and cept forms of the protozoa.	For each: general characteristics clinical infections life cycle	
	<b>Ameba Lab Diagnosis (Entamoeba)</b> E. histolytica E. dispor E. hartmanni E. coli Endolimarl E. nana Iodamoeba I. butschlii Blastocystis hominis	
	<b>Ciliates</b> Balantidium B. coli	
	<b>Flagellates</b> Giardia lamblia Dietamoeba fragilis Chilomastix mesnili Trichomonas vaginalis	

## MLT 205 Diagnostic Microbiology

**WEEK 6**

<b>KNOWLEDGE OBJECTIVES</b>	<b>CONTENT OUTLINE</b>	<b>PERFORMANCE OBJECTIVES</b>
Discuss the life cycle of plasmodium.	<b>Plasmodium</b> liver stage blood stage	Observe prepared slides of blood films for plasmodium and babesia.
Recognize the morphology and laboratory identification of plasmodium.	Plasmodium vivax Plasmodium malarise Plasmodium fulcipaum Plasmodium ovale	Observe prepared slides of trypanosomes.
Differentiate the characteristics for laboratory identification of plasmodium and babesia.	<b>Babesia</b> Chogas disease Trypanosoma Lushmonia	
Identify the life cycle and diagnostic stages of the nematodes.	<b>Nematodes</b> E. vermiculasis Ascaries lumbicoides Tricheria trichiura Strongyloids stercoralis Necatur americanus	Observed prepared slides of common nematodes, cistodes, and trematodes.
Identify the life cycle and diagnostic stages of the cestodes.	<b>Cestodes</b> Taenia saginata Taenia salium Diphyllobothrium latum Hyminolepsis nana	
Identify the life cycle and diagnostic stages of the trematodes.	<b>Trematodes</b>	

## MLT 205 Diagnostic Microbiology

**WEEK 7**

<b>KNOWLEDGE OBJECTIVES</b>	<b>CONTENT OUTLINE</b>	<b>PERFORMANCE OBJECTIVES</b>
<ol style="list-style-type: none"> <li>1. Explain difference between Mycobacterium and most other bacterium.</li> <li>2. Describe identifying characteristics of M. tuberculosis and the anonymous Mycobacterium.</li> </ol>	<p><b>Mycobacterium</b>  cell morphology  acid-fast stain and auramine stain  M. tuberculosis and anonymous types  culture characteristic  special isolation procedures  identification tests  pathogenicity  skin tests for diagnosis</p> <p><b>DNA Technology in Lab</b>  principle - probes</p>	<ol style="list-style-type: none"> <li>1. Perform gram stain and T.B. stain on Q.C. smears.</li> <li>2. With instructor's help, determines whether M. tuberculosis present or absent, and discuss methods used for identification of Mycobacterium.</li> <li>3. Complete a comprehensive lab practical.</li> <li>4. Evaluate unknown specimens.</li> </ol>

**Assignment:** Mahon: Chapters 22 and 5

## MLT 205 Diagnostic Microbiology

**WEEK 7**

<b>KNOWLEDGE OBJECTIVES</b>	<b>CONTENT OUTLINE</b>	<b>PERFORMANCE OBJECTIVES</b>
Discuss the characteristics of yeast and fungi.  Identify the characteristics of fungal preparation.	<b>Mycology terms:</b> hyphase, myalia, septate, aseptate hyphase media for fungus <b>Mycology Stains</b> Luctiphenol cotton blue (KOH) Potassium Hydroxide prep <b>Mycology Preps</b> tease mount slide culture germ tube	Observe preparation of germ tubes and india ink stains using quality control slides.  Observe 34mm slides and prepared stains of the common dermatophytes, systemic mycoses and opportunistic mycoses.
Identify the characteristics of yeast.	<b>Candida albicans</b> germ tube <b>Cryptococcus weoformans</b> india ink <b>Asexual spores of yeast</b> blastospores chlomydospores	
Identify the characteristics and morphology of the dermatophytes, systemic mycoses, subcutaneous opportunistic mycoses.	<b>Dermatophytes</b> Microsporon Trichophyton Epidermophyton <b>Systemic mycoses</b> (Dimorph) histoplasmosis Coccidirdes Blastomyces Paracoccidioides <b>Subcutaneous mycoses</b> Sporotrichosis Chromoblastomycosis <b>Opportunistic mycoses</b> Penicillin Aspergillus	

MLT 205

Name \_\_\_\_\_

QUIZ 1. \_\_\_\_\_  
2. \_\_\_\_\_  
3. \_\_\_\_\_  
4. \_\_\_\_\_  
5. \_\_\_\_\_  
6. \_\_\_\_\_

QUIZ AVERAGE \_\_\_\_\_

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TEST 1. \_\_\_\_\_  
2. \_\_\_\_\_  
3. \_\_\_\_\_  
4. \_\_\_\_\_

TEST TOTAL \_\_\_\_\_

FINAL EXAM \_\_\_\_\_

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TOTAL LECTURE POINTS \_\_\_\_\_

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LAB

Mini practical 1 \_\_\_\_\_

Mini practical 2 \_\_\_\_\_

Specimen Evaluations Lab Practical \_\_\_\_\_

LAB SCORE \_\_\_\_\_

LECTURE + LAB \_\_\_\_\_

TOTAL POINTS \_\_\_\_\_

GRADE \_\_\_\_\_