COURSE OUTLINE

Course number: MLT 214
Course: CLINICAL MICROBIOLOGY
Credits: 6

Hours:
Lecture 5/Lab 3

Prerequisite: MLT 200 or Permission of Instructor
Spring A 2016

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.

Course Modifications: 08/2016

Course Instructor:
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Office hours: by appointment

Course coordinator:
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ShaveL@mccc.edu

Required Text:
Title: Diagnostic Microbiology 13th ed
Author: Bailey & Scott
Publisher: Elsevier 2013
MCCC General Education Core Competencies and Goals

General Education Core Competencies: (GC)
A. Communication: Students will communicate effectively in both speech and writing.
B. Critical Thinking and Problem-Solving: Students will use critical thinking and problem solving skills in analyzing information.
C. Ethical Reasoning and Action: Students will understand ethical issues and situations.
D. 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.
E. Computer Literacy: Students will use computers to access, analyze or present information, solve problems, and communicate with others.
F. Collaboration and Cooperation: Students will develop the interpersonal skills required for effective performance in group situations.
G. Intra-Cultural and Inter-Cultural Responsibility: Students will demonstrate an awareness of the responsibilities of intelligent citizenship in a diverse and pluralistic society, and will demonstrate cultural, global, and environmental awareness.

General Education Goals (GG)
Goal 1. Written and Oral Communication in English: Students will communicate effectively in both speech and writing.
Goal 2. Mathematics: Students will use appropriate mathematical and statistical concepts and operations to interpret data and to solve problems.
Goal 3. Science: Students will use the scientific method of inquiry, through the acquisition of scientific knowledge.
Goal 4. Technology or Information Literacy: Students will use computer systems or other appropriate forms of technology to achieve educational and personal goals.
Goal 5. Social Science: Students will use social science theories and concepts to analyze human behavior and social and political institutions and to act as responsible citizens.
Goal 6. Humanities: Students will analyze works in the fields of art, music, or theater; literature; philosophy and/or religious studies; and/or will gain competence in the use of a foreign language.
Goal 7. History: Students will understand historical events and movements in World, Western, non-Western or American societies and assess their subsequent significance.
Goal 8. Diversity and Global Perspective: Students will understand the importance of a global perspective and culturally diverse peoples.

Course Competencies/Goals:
The student will be able to:

1. Demonstrate knowledge of and adhere to established guidelines for working with potential pathogens to ensure biohazard safety (GC C, D, GG 3)
2. Apply knowledge of specimen integrity. (GC C, GG 3)
3. Evaluating patient samples for potential pathogens and indigenous microflora. (GC B, GG 3)
4. Apply the principles of various staining techniques used in the microbiology laboratory to
evaluate direct smears from specimens and culture smears (GC B, GG 3)
5. Identify the phenotypic characteristics of common pathogenic bacteria, parasites, fungi and emerging bioterrorism agents. (GG 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 (GC A, B, D, GG 1, 3)
7. Give a presentation on a common infectious agent including clinical symptoms, laboratory diagnostics and treatment of the microbe (GC A, B, D, E, GG 1, 3, 4)

**Week 1: Course Introduction, Biology of Microorganisms & Microorganism Identification**

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

**Learning (cognitive) objectives:**

**Week 1**
- 1) Define the terms used to eliminate microorganisms: sterilization, disinfection & antiseptic (GC A, GG 1, 3)
- 2) List the physical and chemical methods of hazardous waste material disposal (GG 3)
- 3) Explain the purpose of MSDS sheets (GC A, D, GG 1, 3)
- 4) List 4 different types of fire extinguishers. Explain how fire extinguishers are properly used in an Emergency (GC B)
- 5) Explain 'standard precautions' as it applies to a clinical microbiology lab setting (GC A, GG 1, 3)
- 6) List organisms found in each Biosafety level 1-4 category. Describe the 4 different classes of Biosafety hoods/cabinets (GG 3)
- 7) Explain the standard guidelines for packaging and transporting infectious materials (GC A, GG 1, 3)
- 8) Describe the lab’s standard protocol for an accidental exposure to an infectious agent or hazardous material (GC A, B, GG 1, 3)
- 9) Explain proper collection methods for microbiology specimens. List some reasons for specimen rejection (GC A, B, GG 1, 3)
- 10) Explain the different purposes for different types of media (GC A, GG 1, 3)
- 11) Describe the proper atmospheric conditions needed for optimal bacterial cultivation (GC A, GG 1, 3)
- 12) Describe components of a good Quality Assurance program (TQM, CQI, PI, PT, Lean, Six Sigma). Explain how Quality Assurance helps to provide quality patient care? (GC A, B, GG 1)
- 13) Explain what a Standard Operating Procedure manual is and why it is important (GC A, D, GG 1)
- 14) Define the Infection Control terms: nosocomial infections (HAIs), multi drug resistant (MDR), Infection Control Committee, mode of transmission, sentinel event, virulence, isolation precautions, surveillance cultures (GC A, GG 1, 3)
- 15) Describe the nomenclature used to classify microorganisms (GC A, GG 1, 3)
- 16) Distinguish between the terms phenotypic and genotypic; prokaryotic and eukaryotic (GG 3)
17) Describe the different ways microorganisms can transfer genetic information (GC A, GG 1, 3)
18) Explain the different metabolic pathways that microorganisms use to form energy (GC A, GG 1, 3)
19) Describe the difference in the cell wall formation of gram positive and negative organisms (GC A, GG 1, 3)
20) Define the terms: colonization, infection, normal flora, opportunistic pathogen (GC A, GG 1, 3)
21) Distinguish between humoral and cell mediated immunity (GG 3)
22) Describe the difference between an acute, chronic and latent infection (GC A, GG 1, 3)
23) Define epidemiological terms (GC A, GG 1, 3)
24) Compare the different of microscopes used in diagnostic labs (Light, fluorescent, electron) (GG 3)
25) Distinguish between traditional (phenotypic) and molecular (genotypic) identification methods (GG 3, 7)
26) Explain common immunological and serological techniques used in infectious agent identification (GC A, GG 1, 3)

Performance (psychomotor) objectives:
1) Demonstrate the operation of an autoclave used for sterilizing objects and fluids (GG 2, 3)
2) Follow specimen collection protocols for attaining various clinical laboratory specimens. (GG 3)
3) Set up cultures from various body sites using different media and streaking techniques. (GG 3)
4) Streak agar plates qualitatively and quantitatively for isolated colonies. (GG 2, 3)
5) Place cultures in the appropriate atmospheric conditions for optimal growth of pathogens (GG 3)
6) Properly store specimens for further testing (GG 3)
7) Properly operate and perform maintenance on a light microscope (GG 3)
8) Determine and record the morphology of bacterial colonies grown on agar (GG 3)
9) Apply the use of proper Gram staining technique. Determine the staining characteristics of gram positive and gram negative bacteria (GC B, GG 3)

Week 2: Staphylococcus, Streptococcus & Gram Positive Rods
Upon completion of this week, the student will be able to:

Learning (cognitive) objectives:
1) Differentiate the phenotypic characteristics of Staphylococcus and Micrococcus spp. (GG 3)
2) Explain the principles of the conventional tests used to identify Staphylococcus spp.: Catalase, coagulase slide & tube, Staphaurex™ (GC A, GG 1, 3)
3) Describe the 2 different mechanisms that result in resistant strains of Staph (GC A, B, GG 1, 3)
4) Explain the ‘D test’ and the implications of a positive test (GC A, GG 1, 3)
5) List the species of Streptococcus that are considered 1) Alpha hemolytic, 2) Beta hemolytic and 3) Gamma (non) hemolytic (GG 3)
6) Name some of the conventional biochemicals and immunological tests used to identify Strep species (GC A, GG 1, 3)
7) Explain the laboratory method for isolating and identifying nutritionally variant Strep (GC A, B, GG 1, 3)
8) Name the natural habitat and clinical significance of Bacillus anthracis, B. cereus and B.subtilis (GG 3)
9) Differential between pathogenic and nonpathogenic strains of Corynebacterium (GG 3)
10) Describe how Listeria infections are spread and which laboratory methods are used to identify it (GC A, GG 1, 3)
11) List the disease states associated with Erysipelothrix, Gardnerella and Lactobacillus spp. (GG 3)

Performance (psychomotor) objectives:
1) Fill in daily ‘Preventative Maintenance’ chart and record any necessary trouble shooting (GC B, D)
2) Perform ‘parallel testing’ with different lots of testing kits (GC B, GG 3)
3) Set up stock cultures of ATTC strains of bacteria for laboratory QC (GG 3)
4) Identify gram positive unknown using gram staining, biochemical and immunological techniques (GC B, GG 2, 3)

Week 3: Oxidase negative, MacConkey positive Gram Negative Rods, Oxidase positive, MacConkey positive Gram Negative Rods & Oxidase positive, MacConkey negative Gram Negative Rods

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

Learning (cognitive) objectives:
1) Describe the phenotypic traits that characterize the Enterobacteriaceae family. Differentiate between pathogenic and normal fecal flora in this family (GC A, GG 1, 3)
2) List the selective and differential agars used in isolating gram negative rods (GC B, GG 3)
3) Explain the clinical significance of E.coli O157:H7 (GC A, GG 1, 3)
4) Define ESBL, KPC and MDR isolates (GC A, GG 1, 3)
5) Explain how to set up and interpret a ‘Modified Hodge Test’ (GC A, B, GG 1, 2, 3)
6) Describe the phenotypic characteristics and clinical significance of the gram negative non-fermenters: Acinetobacter, Bordetella, Burkholderia, Pseudomonas, Stenotrophomonas, Ralstonia, Chrysemonas and Flavimonas (GC A, GG 1, 3)
7) Outline the normal habitat and general characteristics of the following gram negative rods (Achromobacter, Alcaligenes, Comamonas, Flavobacterium, Moraxella spp.) (GG 3)
8) Describe the colonial morphology of Vibrio spp. and specialized media used for isolation (GC A, GG 1, 3)
9) Explain the clinical significance of Aeromonas, Chromobacterium and Sphingomonas spp. (GCA, GG 1, 3)
10) Identify the key phenotypic characteristics and clinical significance of Eikenella and Pasteurella spp. (GG 3)
11) Identify the key phenotypic characteristics and clinical significance of Actinobacillus, Kingella, Capnocytophaga and Cardiobacterium spp. (GG 3)

Performance (psychomotor) objectives:
1) Perform conventional biochemical testing on common gram negative pathogens (GC B, GG 3)
2) Set up commercial biochemical tests for the identification of gram negative pathogens (GG 3)
3) Use biochemical profile testing to identify microorganisms (GC B,D,GG 3)
4) Demonstrate how an automated system is used for identification of pathogenic bacteria (GG 3)
5) Identify gram negative unknown using gram staining and biochemical profiling (GC B, GG 3)

Week 4: Haemophilus, Neisseria & Moraxella, Special GNRs & Antimicrobials, Obligate Anaerobes

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

Learning (cognitive) objectives:
1) Detail the clinical symptoms seen in infections with Haemophilus spp.: H.influenzae, H.parainfluenzae, H.ducreyi, H.aegyptius, H.hemolyticus, H.parahemolyticus (GC A, GG 1, 3)
2) Describe the unique growth requirements needed to cultivate members of Haemophilus spp. (GC A, GG 1, 3)
3) List the clinical symptoms resulting from an infection with Neisseria gonorrhoeae, N.meningitides and Moraxella catarrhalis (GG 3)
4) Describe growth requirements for cultivating Neisseria spp. and Moraxella catarrhalis (GC A, GG 1, 3)
5) Explain how Haemophilus, Neisseria and Moraxella catarrhalis can be definitively identified in the lab (GC A, B,GG 1, 3)
6) Discuss the various habitat for Bartonella spp. (GC A, GG 1, 3)
7) Describe the pathogenesis, identification methods and treatment of Helicobacter pylori (GC A,GG 1, 3)
8) List the pathogenic species of Campylobacter and explain how it is identified in the lab. (GG 3)
9) Identify the causative agent of Legionnaire’s disease and diagnostic methods (GG 3)
10) Discuss the various habitats for Brucella spp. and the clinical symptoms caused by infection with these organisms (GC A, GG 1, 3)
11) Name the causative agent of whooping cough and tularemia. Explain the lab methods used to identify these infectious agents (GC A, GG 1, 3)
12) List the classes of antimicrobials and their mode of action (GG 3)
13) Differentiate between: antimicrobial and antibiotic; synergy and antagonism; sensitive, intermediate and resistant; bactericidal and bacteriostatic (GG 3)
14) Explain 5 different mechanisms of antimicrobial resistance (GC A, B, GG 1, 3)
15) Discuss the procedures and test result interpretations for manual, automated and molecular methods used for susceptibility and resistance testing (GC A, B, GG 1, 2, 3)
16) Give an overview of methods used to cultivate and identify anaerobic bacteria (GC A, B, GG 1, 3)
17) List pathogenic anaerobes and explain their pathogenesis (GC A, GG 1, 3)

**Performance (psychomotor) objectives:**
1) Identify *Haemophilus, Neisseria, Moraxella catarrhalis* and obligate anaerobic bacteria using gram staining and biochemical profiling (GC B, D, GG 3, 4)
2) Set up manual susceptibility tests using Kirby Bauer diffusion disks and E tests for aerobic and anaerobic microorganisms (GG 3)
3) Interpret results of manual susceptibility tests (GG 2, 3)
4) Demonstrate how automated systems are used for the susceptibility testing of pathogenic bacteria (GG 2, 3)
5) Employ the proper techniques for cultivating and identifying *Campylobacter* in the laboratory. (GG 3)

**Week 5: Unusual Bacteria, the Actinomycetes & Acid Fast Bacillus (Mycobacteria)**

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

**Learning (cognitive) objectives:**
1) List pathogenic bacteria that are non-culturable and their pathogenesis (GG 3)
2) List the 2 cell wall deficient bacteria and their pathogenesis (GG 3)
3) Describe the morphology, cultivation and test methods used to identify Spirochetes (GC A, GG 1, 3)
4) Describe the morphology, growth requirements and test methods used to identify *Actinomycetes spp.* (GC A, GG 1, 3)
5) Explain how Mycobacteria differ from other classes of bacteria in terms of composition, staining characteristics, cultivation and identification (GC A, GG 1, 3)
6) Explain when it is necessary to do susceptibility testing on *Mycobacterium spp.* (GC A, B, GG 1, 3)

**Performance (psychomotor) objectives:**
1) Determine if a patient may have syphilis by performing an RPR and observe a demonstration of an FTA confirmatory test. (GC B, GG 3)
2) Perform an EIA test on a patient’s sample to test for a *Mycoplasma pneumonia* infection (GG 3)
3) Prepare 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 (GG 3)
4) Demonstrate cultivation techniques, biochemical tests and molecular assays used in the identification of the *Actinomycetes* and *Mycobacteria spp.* (GG 3)
Week 6: Blood Parasites, Protozoan Parasites & the Helminthes
At the completion of this week, the student will be able to:

Learning (cognitive) objectives:
1) Name the different types of specimens collected for the identification of parasites (GC A, GG 1, 3)
2) Explain the life cycle and morphology of Plasmodium, Babesia, Trypanosoma and Leishmania spp. (GC A, GG 1, 3)
3) Describe the best diagnostic method for identifying the following intestinal pathogens: Entamoeba, Endolimax, Iodamoeba, Blastocystis, Giardia, Chilomastix, Dientamoeba, Balantidiium, Cryptosporidium, Cyclospora, Isospora, Sarcocystis, Enterocytozoon and Encephalitozoon spp. (GC A, B, GG 1, 3)
4) Differentiate pathogenic microfilaria based on the presence of a sheath & tail nuclei (GG 3)
5) Diagram the life cycle of Schistosomes and identify the eggs of the 5 different species (GG 3)
6) List the parasites that can cause meningitis and encephalitis. (GG 3)
7) Explain specimen collection requirements are for the isolation of Trichomonas vaginalis (GC A, GG 1, 3)
8) List the populations that are at risk for infections with Toxoplasma spp. (GG 3)
9) Describe the life cycle and unique morphology of the intestinal nematodes: Ascaris, Enterobius, Strongyloides, Trichuris, Ancylostoma and Necator spp. (GC A, B, GG 1, 3)
10) Identify the following structures of the parasitic Cestodes: scolex, suckers, proglottid and Rostellum (GG 3)
11) Define ‘hydatid cyst’ (GC A, GG 1, 3)
12) Describe the life cycle of Taenia solium (pork tapeworm) (GC A, GG 1, 3)
13) Describe the unique morphology of the clinically significant intestinal, liver and lung Trematodes: Fasciolopsis, Clonorchis, Fasciola, Paragonimus spp. (GC A, GG 1, 3)

Performance (psychomotor) objectives:
1) Set up thick and thin smears for the observation and identification of blood parasites (GG 3)
2) Determine the morphological characteristics of blood parasites (GC B, GG 3)
3) Calculate the percentage of parasitemia (GG 2)
4) Watch a demonstration of how to prepare a trichrome smear on a stool specimen (GG 3)
5) Examine smears to observe the unique characteristic of protozoan parasites. Be able to use a Parasite Atlas to assist in identification features (GC D, GG 3)

Week 7: Mycology, Virology & Infections in Organ Systems
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 (GC A, GG 1, 3)
2) Differentiate between superficial, cutaneous, subcutaneous and systemic mycosis. Give an example of each (GG 3)
3) List the media used in the cultivation of molds and yeast (GG 3)
4) List the common dermatophytes and describe their pathogenesis (GG 3)
5) Describe common antifungal agents and their mode of action (GC A, GG 1, 3)
6) Explain how molds and yeast are identified (GC A, B, GG 1, 3)
7) Describe the recent taxonomic changes made for Pneumocystis jiroveci (GC A, GG 1, 3)
8) Describe the structure of a ‘virion’ (GC A, GG 1, 3)
9) Explain the steps of viral pathogenesis (GC A, B, GG 1, 3)
10) Give an overview of specimen collection for viral cultures (GC A, B, GG 1, 3)
11) Outline the traditional and modern ways of identifying viruses: cell culture, shell vial, hemadsorption, Tzanck smear, immunological, serological and molecular methods (GC B, GG 3)
12) List the viral families and give an example of a virus found in each (GG 3)
13) Explain how viral susceptibility testing differs from bacterial (GC A, B, GG 1, 3)
14) Name the commonly used antiviral agents (GC A, GG 1, 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 (GC A, B, GG 1, 3, 5)

**Performance (psychomotor) objectives:**

1) Examine trichrome smears to identify the unique features of helminth eggs and worms. Be able to use a Parasite Atlas to assist in identification features. (GC B, D, GG 3)
2) Perform staining techniques used in the identification of molds and yeast. Be able to use a Mycology Atlas to assist in identification features (GC D, GG 3)
3) Set up a biochemical test for the identification of yeast. Interpret the test results using an online compendium (GC B, D, E, GG 3)
4) Demonstrate how to set up a cell culture and shell vial for virus isolation and identification (GC B, GG 3)
5) Determine the CPE (cytopathic effect) seen in cell cultures. Observe fluorescent staining of viral inclusions from a shell vial (GC B, GG 3)

**PERFORMANCE EXIT LEVEL SKILLS**

1. Demonstrate safety and quality control practices in clinical microbiology (GC C, GG 3)
2. Operate an autoclave used for the sterilization of objects and fluids. (GG 3)
3. Collect microbiology specimens and set up cultured from various body sites (GC B, GG 3)
4. Properly operate and perform maintenance on a light microscope (GG 3)
5. Determine the morphology of bacterial colonies and staining characteristics of gram positive and gram negative bacteria (GC B, GG 3)
6. Complete daily ‘Preventative Maintenance’ chart and record all corrective action (GC B, GG 2, 3)
7. Perform ‘parallel testing’ on diagnostic test kits (GC B, GG 3)
8. Set up stock cultures of ATTC strains of bacteria for laboratory QC (GG 3)
9. Identify gram positive and gram negative unknowns using gram staining, conventional, commercial and automated biochemical profiling and immunological techniques (GC B, D, GG 3)
10. Cultivate and identify obligate anaerobic bacteria (GC B, GG 3)
11. Set up and interpret manual susceptibility tests (GC B, GG 3)
12. Demonstrate how automated systems are used for susceptibility testing (GC B, GG 3)
13. Use a serological test to diagnose an infectious disease; interpret the test results (GC B, GG 2, 3)
14. Perform staining techniques, cultivation and diagnostics tests used for identifying Actinomycetes and Mycobacteria spp. (GG 3)
15. Set up thick and thin smears for the observation blood parasites. Identify blood parasites based on their unique morphological characteristics (GC B, GG 3)
16. Prepare a trichrome smear on a stool specimen. Describe the unique characteristics of protozoan and helminth parasites (GC B, GG 3)
17. Perform staining techniques used in the identification of molds and yeast (GG 3)
18. Identify common fungal pathogens based on their unique phenotypic characteristics (GC B, GG 3)
19. Set up a cell culture and shell vial for the isolation and identification of viruses (GG 3)
20. Identify viral CPE (cytopathic effects) seen in cell cultures and shell vials (GC B, GG 3)

AFFECTIVE OBJECTIVES:

Affective objectives are behavioral standards that will be implemented during the professional phase of the Medical Laboratory Technology Program. Students will be evaluated by faculty using these standards throughout the course. Unsatisfactory performance in any area of the behavioral standards will require a consultation with the faculty and/or the MLT Program coordinator. The reason for the consultation will be clearly stated, counsel will be given and an action plan will be implemented. The student will be given the opportunity to give a written response. The consultation form will be kept in the student’s file.

Affective standards:
1. Safety: Complies with safety protocol for the protection of self and others (GC C, D)
2. Follows assignment instructions and Standard Operating Procedures (GC D)
3. Keeps neat and complete records (GC A, CC 1, 2)
4. Professional ethics: Acts honesty and with integrity; admits and corrects mistakes (GC C)
5. Punctual (GC C)
6. Attendance (GC C)
7. Professional appearance (GC C)
8. Interrelationships: considerate of other students, faculty and program coordinator; pleasant to work with; a cooperative team player (GC A, F, G, GG 1, 8)
9. Keeps work area clean and organized (GC C)
10. Organization: Works in a productive and efficient manner (GC C)
11. Time management. Completes assignment in the established time frame (GC C)
12. Disposes waste appropriately (GC C)
13. Completes assignment with minimal supervision and assistance; self-directed; able to work independently (GC C)
14. Displays a commitment to accuracy and precision in obtaining and reporting test results (GC B, C, GG 4)
15. Economical use of supplies (GC C)
16. Maintains composure under stress, pressure and criticism: reacts in a positive manner to constructive criticism (GC C)
17. Communication skills: Clear and concise expression of ideas, asks questions and gives appropriate feedback. Actively listens. (GC A, G)
18. Shows adaptability to change (GC C)
19. Displays enthusiasm in the area of Medical Laboratory Technology; shows interest and an eagerness to learn (GC C)
20. Demonstrates a commitment to patient confidentiality; discrete about patient medical information and laboratory result testing (GC C, D)

AFFECTIVE OBJECTIVE EVALUATION:
Students will be graded on each standard through observation on a scale of 1-5

5 - Excellent
4 - Above average
3 - Average
2 - Below average
1 - Needs improvement

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<th>Affective Objective</th>
<th>Evaluation Score</th>
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<td>1. Safety</td>
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<td>2. Follows Instructions</td>
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COURSE GRADING POLICY

To receive a passing grade and proceed to the next MLT course, the student must earn a 77 or better in all professional phase Medical Laboratory Technology courses.

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<tr>
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<td>0-59%</td>
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Lecture
- 5 Quizzes: 10%
- 6 Homeworks: 10%
- 2 Flowcharts: 10%
- Lecture Midterm: 20%
- Lecture Final: 20%
- Affective score: 10%
- Total: 80%

Labs
- Lab Midterm: 10%
- Lab Final: 10%
- Total Lab: 20%

**Attendance Policy**

Students are expected to attend all lecture and laboratory sessions. If an absence is anticipated, please e-mail the course instructor at clinicalmicro214@gmail.com. Students are responsible for any material missed. There are no make-up labs.
**Academic Integrity**

Your examinations (tests, quizzes, assignments, laboratory work and practicals) must reflect your individual work and knowledge. Any exchange of information by talking, writing, electronic devices or gestures constitutes a violation of academic integrity. All academic integrity violations will be reported to the college’s Academic Integrity Committee.

**Support Services for Differing Abilities**

Mercer County Community College is committed to ensuring the full participation of all students in its programs. If you have a documented differing ability, or think that you may have differing ability that is protected under the ADA and section 504 of the Rehabilitation Act, please contact Arlene Stinson in LB 216 stinsona@mccc.edu for information regarding support services.

If you do not have a documented differing ability, other support services are available to all students on campus including the Learning Center located in LB 214.

**Financial Aid Application**

It is recommended that students complete an application for financial aid to determine eligibility for financial assistance. The application is FREE and available for completion beginning October 1, 2016 for the 2017-18 academic year. Visit www.fafsa.ed.gov to complete your application. Applications should be completed before December 1, 2016. Students who are interested in MCCC Foundation scholarships are expected to complete an application as well.