



Western Technical College

10513133 Clinical Microbiology

Course Outcome Summary

Course Information

Description	This course presents the clinical importance of infectious diseases with emphasis upon the appropriate collection, handling and identification of clinically relevant bacteria. Disease states, modes of transmission and methods of prevention and control, including antibiotic susceptibility testing, will also be discussed.
Career Cluster	Health Science
Instructional Level	Associate Degree Courses
Total Credits	4
Total Hours	126

Pre/Corequisites

Prerequisite	10806197 Microbiology
Prerequisite	10513120 Basic Hematology

Textbooks

Textbook of Diagnostic Microbiology. 7th Edition. Copyright 2023. Mahon, Connie R., Donald C. Lehman, and George Manuseis Jr. Publisher: Elsevier Science. **ISBN-13**: 978-0-323-82997-7. Required.

513-133 Clinical Microbiology Study Guide and Lab Manual. Western. Publisher: Western. **ISBN-13**: 979-8-822-72050-3. Required.

Learner Supplies

Lab Coat - \$20. **Vendor**: Campus Shop. Required.

Safety Glasses. **Vendor:** Campus Shop. Required.

Sharpie Permanent Marker. **Vendor:** Campus Shop. Required.

Three-ring binder. **Vendor:** Campus Shop. Required.

Success Abilities

1. Live Responsibly: Embrace Sustainability

Program Outcomes

1. Practice laboratory safety and regulatory compliance
2. Monitor and evaluate quality control in the laboratory
3. Apply modern clinical methodologies including problem solving and troubleshooting according to predetermined criteria
4. Correlate laboratory results to diagnosis of clinical conditions and/or diseases

Course Competencies

1. Perform basic microbiological techniques.

Assessment Strategies

- 1.1. through a lab report or oral written or graphic exercise
- 1.2. and/or through a practical, written exam

Criteria

You will know you are successful when:

- 1.1. you isolate colonies on selective and/or differential media.
- 1.2. you demonstrate aseptic technique when working with cultures.
- 1.3. you differentiate organisms by colonial morphology when they are grown on selective and/or differential media.
- 1.4. you perform and interpret the Gram stain procedure.
- 1.5. you correctly inoculate, perform, and interpret biochemical tests.
- 1.6. you perform appropriate serological tests.
- 1.7. you describe alternate identification methods such as molecular, MALDI and instrumentation.
- 1.8. you perform all microbiological work in a safe manner according to OSHA standards.
- 1.9. you perform and interpret QC as necessary for procedures completed.

Learning Objectives

- 1.a. Describe microbiology lab safety procedures.
- 1.b. Contrast principles of Biosafety levels 1 - 3.
- 1.c. Categorize commonly used bacterial medias by type.
- 1.d. Review environmental growth requirements of commonly isolated organisms.
- 1.e. Describe appearance of common organisms on various medias.
- 1.f. Describe methods and purposes of inoculating plate and tube medias.
- 1.g. Describe methods of colony enumeration in relative and quantitative terms.
- 1.h. Review Gram stain principle.
- 1.i. Compare gram stain microscopic appearance of common organisms.
- 1.j. Describe a Quality Control program for microbiology procedures.

2. Examine collection, processing, and interpretation of results for various microbiological specimens.

Assessment Strategies

- 2.1. Case Study
- 2.2. Written Objective Test

Criteria

- 2.1. you evaluate specimen source.
- 2.2. you identify technique used.
- 2.3. you identify special handling requirements.
- 2.4. you interpret data.
- 2.5. you identify tool supported by relevant evidences.

Learning Objectives

- 2.a. Describe culture collection methods.
- 2.b. Describe proper specimen transport systems and handling procedures.
- 2.c. List criteria for specimen rejection.
- 2.d. Describe specimen processing methods.
- 2.e. Select proper media for specimen type.
- 2.f. Describe direct smear preparation and examination methods.
- 2.g. Differentiate normal flora from pathogenic organisms by body site.
- 2.h. Describe colony quantitation methods.

3. Perform routine ID procedures for Staphylococcus (staph) and Streptococcus (strep).

Assessment Strategies

- 3.1. Lab Report

Criteria

You will know you are successful when:

- 3.1. you select correct media for the specimen source.
- 3.2. you isolate multiple organisms from mixed cultures.
- 3.3. you select appropriate environment and length of incubation.
- 3.4. you recognize colony morphology differences in Staph and Strep.
- 3.5. you differentiate Staphylococci from Streptococci by Gram stain.
- 3.6. you differentiate staphylococci from streptococci by differential testing.
- 3.7. you interpret data to identify the organism.
- 3.8. you determine if antibiotic testing is needed.
- 3.9. you correlate organisms with the disease process and patient factors.

Learning Objectives

- 3.a. Differentiate Staph and Strep by colony morphology on various medias.
- 3.b. Predict Staph and Strep species by gram stain microscopic appearance.
- 3.c. Select appropriate biochemical and serologic tests to identify common Staph and Strep species.
- 3.d. Explain biochemical test principles.
- 3.e. Explain serologic test principles.
- 3.f. Evaluate biochemical and serologic test results to identify organisms.
- 3.g. Interpret clinical significance of culture results from various body sites.
- 3.h. Predict susceptibility patterns of common pathogens.
- 3.i. Describe virulence factors and disease processes of common pathogens.

4. Perform routine ID procedures for Neisseria and Haemophilus.

Assessment Strategies

- 4.1. Report

Criteria

You will know you are successful when:

- 4.1. you isolate multiple organisms from mixed cultures.
- 4.2. you select appropriate environment and length of incubation.
- 4.3. you recognize colony morphology differences in Neisseria and Haemophilus.
- 4.4. you differentiate Neisseria and Haemophilus by gram stain.
- 4.5. you differentiate Neisseria and Haemophilus by differential testing.
- 4.6. you interpret data to identify the organism.

- 4.7. you determine if antibiotic testing is needed.
- 4.8. you correlate organisms with the disease process and patient factors.

Learning Objectives

- 4.a. Recognize common Neisseria and Haemophilus species by colony morphology on various medias.
- 4.b. Recognize common Neisseria and Haemophilus species by gram stain morphology.
- 4.c. Select appropriate identification tests for common Neisseria and Haemophilus pathogens.
- 4.d. Describe test principles of identification tests.
- 4.e. Interpret test results to identify common pathogens.
- 4.f. Analyze clinical significance of culture isolates from various body sites.
- 4.g. Predict susceptibility test patterns of common pathogens.
- 4.h. Describe virulence factors of common pathogens.
- 4.i. Describe disease characteristics of common pathogens.
- 4.j. Describe culture and microscopic characteristics of other gram-negative fastidious organisms (Pasteurella, Brucella, Francisella).
- 4.k. Describe disease characteristics of other gram-negative fastidious organisms.

5. Perform routine ID procedures for Enterics and other stool pathogens.

Assessment Strategies

- 5.1. Reports

Criteria

You will know you are successful when:

- 5.1. you isolate multiple organisms from mixed cultures.
- 5.2. you select appropriate environment and length of incubation.
- 5.3. you recognize colony morphology differences in Enterics and other stool pathogens.
- 5.4. you differentiate Enterics and other stool pathogens by gram stain.
- 5.5. you differentiate Enterics and other stool pathogens by differential testing.
- 5.6. you interpret data to identify the organism.
- 5.7. you determine if antibiotic testing is needed.
- 5.8. you correlate organisms with the disease process and patient factors.

Learning Objectives

- 5.a. Differentiate pathogens from normal flora by colony morphology on various medias.
- 5.b. Select appropriate medias and identification tests.
- 5.c. Interpret biochemical and serologic test results to identify common enteric organisms.
- 5.d. Describe test principles of identification and serologic tests.
- 5.e. Correlate clinical significance of culture results.
- 5.f. Describe organism virulence factors.
- 5.g. Outline diseases caused by enteric bacteria.
- 5.h. Predict susceptibility patterns of common enteric pathogens.
- 5.i. Describe culture and microscopic characteristics for other stool pathogens.
- 5.j. Select identification methods for other stool pathogens.
- 5.k. Describe diseases caused by other stool pathogens.

6. Perform routine ID procedures for the non-fermenters.

Assessment Strategies

- 6.1. Reports

Criteria

You will know you are successful when:

- 6.1. you isolate multiple organisms from mixed cultures.
- 6.2. you select appropriate environment and length of incubation.
- 6.3. you recognize colony morphology differences in non-fermenters.
- 6.4. you differentiate non-fermenters by gram stain.
- 6.5. you differentiate non-fermenters by differential testing.
- 6.6. you interpret data to identify the organism.
- 6.7. you determine if antibiotic testing is needed.
- 6.8. you correlate organisms with the disease process and patient factors.

Learning Objectives

- 6.a. Contrast culture characteristics of nonfermenters and Enterobacteriaceae.
- 6.b. Select appropriate biochemical tests to identify *Ps. aeruginosa* and any other common nonfermenters.
- 6.c. Explain biochemical test principles.
- 6.d. Interpret identification and microscopic test results.
- 6.e. Discuss nonfermenter virulence factors and disease characteristics of common nonfermenters.
- 6.f. Predict antibiotic susceptibility patterns for *Pseudomonas aeruginosa*.

7. Perform routine ID procedures for miscellaneous bacteria.

Assessment Strategies

- 7.1. Reports

Criteria

You will know you are successful when:

- 7.1. you isolate multiple organisms from mixed cultures.
- 7.2. you select appropriate environment and length of incubation.
- 7.3. you recognize colony morphology differences in miscellaneous bacteria.
- 7.4. you differentiate miscellaneous bacteria by gram stain.
- 7.5. you differentiate miscellaneous bacteria by differential testing.
- 7.6. you interpret data to identify the organism.
- 7.7. you determine if antibiotic testing is needed.
- 7.8. you correlate organisms with the disease process and patient factors.

Learning Objectives

- 7.a. Identify miscellaneous bacteria of medical significance
- 7.b. Describe test methods to identify spirochete infections.
- 7.c. Describe spirochete clinical characteristics.
- 7.d. Review diseases caused by *Chlamydia* and *Mycoplasma*.
- 7.e. Describe test method used to identify *Chlamydia* and *Mycoplasma*.

8. Perform routine ID of gram positive aerobic bacilli.

Assessment Strategies

- 8.1. Reports

Criteria

You will know you are successful when:

- 8.1. you isolate multiple organisms from mixed cultures.
- 8.2. you select appropriate environment and length of incubation.
- 8.3. you recognize colony morphology differences in miscellaneous bacteria.
- 8.4. you differentiate miscellaneous bacteria by gram stain.
- 8.5. you differentiate miscellaneous gram positive bacilli by differential testing.
- 8.6. you interpret data to identify the organism.
- 8.7. you determine if antibiotic testing is needed.
- 8.8. you correlate organisms with the disease process and patient factors.

Learning Objectives

- 8.a. Describe clinical characteristics of *Corynebacterium*, *Listeria*, and other non-sporeforming gram positive rods.
- 8.b. Describe biochemical tests used to identify non-spore forming gram positive rods.
- 8.c. Describe clinical characteristics of *Bacillus* species.
- 8.d. Differentiate *Bacillus* species by microscopic and biochemical tests.

9. Interpret susceptibility testing.

Assessment Strategies

- 9.1. Product

Criteria

You will know you are successful when:

- 9.1. you follow established procedures for documentation.

- 9.2. you document sensitivity and resistance results.
- 9.3. you interpret appropriateness of antibiotic therapy.

Learning Objectives

- 9.a. Describe the procedure for Kirby Bauer Susceptibility testing
- 9.b. Describe standardization of the Kirby Bauer procedure
- 9.c. Discuss the interpretation of Kirby Bauer testing results
- 9.d. Discuss methods of quality control for Kirby Bauer testing
- 9.e. Describe the procedure for MIC Susceptibility testing
- 9.f. Describe standardization of the MIC procedure
- 9.g. Discuss the interpretation of MIC testing results
- 9.h. Discuss methods of quality control for MIC testing
- 9.i. Describe direct determination methods for susceptibility testing
- 9.j. Define the following: MIC, MBC, sensitive, resistant, intermediate, antibiotic, antimicrobial
- 9.k. Classify antibiotics by spectrum of activity.
- 9.l. Predict susceptibility of common pathogens to commonly used antibiotics.