

# Microbiology

## Course Syllabus

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### Course Description

Microbiology builds the foundation for understanding various clinical applications and procedures related to medical microbiology. Students will learn clinical procedures, infection prevention, and microbiological diseases with the following topics:

- Background of Microbiology
- Medical Microbiology
- Medical Microbiology Specialties
- Infection Prevention
- Protecting Patients and Ourselves
- Microbiology-Related Procedures
- Immunizations and Antimicrobials
- Microbiological Diseases: Non-respiratory Infectious Diseases
- Respiratory-Related Microbiological Diseases

### Learning Outcomes

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

- Describe the steps, in order, of the immune response to infection.
- List six general guidelines for ensuring accurate results in specimen collection.
- Explain the protective structures of viruses, parasites, fungi, and prions.
- Discuss the advantages of four different methods of sterilization and disinfection.
- List four routes of transmission and precautions that can be used to help prevent infection.
- Identify the guidelines for maintaining a sterile field.
- Define five viruses treated with antiviral drugs.
- List common infections associated with major body systems.
- Describe five types of pneumonia.

### Course Outline and Objectives

#### Chapter 1: Background of Microbiology

1. List the classification of microorganisms.
2. Describe the function of each structure of a eukaryotic cell.
3. Differentiate between normal flora and pathogens.
4. Describe the immune system, listing the various components and how they work to eliminate microbes.
5. Contrast modes of disease transmission.
6. Discuss how infections develop in humans.

#### Chapter 2: Medical Microbiology

1. Differentiate various areas of medical microbiology specialization and study.
2. Describe the history of microbiology.
3. Describe the evolution of the "science" of microbiology.
4. Discuss scientific principles of inquiry and research to include scientific reasoning and communicating results for public health.

5. Contrast bacterial structure and morphology.
6. Discuss the process and importance of bacterial staining.
7. Describe the technique and importance of bacterial culture and sensitivity.
8. Explain reasons for the development of antibiotic resistance.

### Chapter 3: Medical Microbiology Specialties

1. List and define additional areas of medical microbiology specialization and study to include virology, mycology, and parasitology.
2. Differentiate among parasites, fungi, viruses, and prions.
3. Relate diseases caused by parasites, fungi, viruses, and prions.
4. Describe medical treatments for microbial infections related to parasites, fungi, viruses, and prions.

### Chapter 4: Infection Prevention

1. Define the basic terms related to infection control.
2. Discuss the chain of infection.
3. Contrast germicidal susceptibility of various microorganisms.
4. Discuss issues to consider when killing microorganisms.
5. Describe the different methods used to disinfect and sterilize medical equipment to include heat, pasteurization, boiling water, steam, liquid compounds, radiation, and gas sterilization.

### Chapter 5: Protecting Patients and Ourselves

1. Describe the various portals of entry and related microorganisms and diseases.
2. Contrast the different routes of transmission of infection.
3. List and define the types of precautions that are used in the health care environment.
4. Explain the importance of proper hand hygiene.
5. Describe standard precautions.
6. Differentiate contact, droplet, and airborne precautions.
7. List the various types of personal protective equipment and when it would be appropriate to wear the equipment.
8. Describe safe injection practices.
9. Explain safe handling of potentially contaminated surfaces or medical equipment.
10. Describe OSHA regulations as they pertain to health care workers.

### Chapter 6: Microbiology-Related Procedures

1. Contrast infectious and noninfectious waste.
2. Describe infectious waste disposal procedures.
3. Describe the correct method for applying and removing sterile and nonsterile gloves.
4. Distinguish between medical and surgical asepsis.
5. Describe guidelines for the maintenance of a sterile field.
6. List the general principles of specimen collection to include blood, cerebrospinal fluid (CSF), sputum, and throat, nasal, and wound cultures.
7. Describe the procedure for obtaining a urine specimen and stool sample.
8. Discuss why appropriate specimen collection is important.
9. Given a specific site, discuss the appropriate procedures for obtaining a clinically useful specimen from that body site.

## Chapter 7: Immunizations and Antimicrobials

1. Define basic disease terminology and concepts.
2. Contrast the difference between active and passive immunity.
3. Describe why drugs that induce passive immunity in a patient are important to assist in the treatment of patients with certain infectious diseases.
4. Discuss how patients with infectious diseases are monitored both clinically and from a laboratory perspective.
5. List the various mechanisms of antimicrobial resistance.
6. Discuss the importance of appropriate prescribing and consumption of antimicrobials.
7. Compare and contrast the different ways of classifying antibiotics.
8. Given a particular antibiotic, provide the classification or grouping to which it belongs, potential therapeutic uses, and toxicity.
9. Discuss the various types of antivirals, their potential clinical uses, and toxicity.
10. Compare and contrast antifungal drugs according to their spectrum of activity, route of administration, and toxic effects.

## Chapter 8: Microbiological Diseases: Non-Respiratory Infectious Diseases

1. Describe the symptoms, the types of organisms, and treatment for infectious diseases of the head and neck to include meningitis, encephalitis, otitis media, and parotitis.
2. Given a particular infection, list the possible antimicrobial treatments for a patient with that infection.
3. List the viral causes of encephalitis.
4. Discuss when a clinician should initially avoid antimicrobials for a child with acute otitis media.
5. Describe the symptoms, the types of organisms, and treatment for infectious diseases of the eye to include conjunctivitis and keratitis.
6. Discuss differences in the clinical presentation of viral versus bacterial conjunctivitis.
7. Describe the symptoms, the types of organisms, and treatment for infectious diseases of the cardiovascular system to include endocarditis and catheter-related bloodstream infections (CRBSIs).
8. Describe the symptoms, the types of organisms, and treatment for infectious diseases of the skin and soft tissue.
9. Compare and contrast erysipelas with cellulitis.
10. Describe the symptoms, the types of organisms, and treatment for intra-abdominal infectious diseases to include appendicitis, acute cholecystitis, diverticulitis, *Clostridium difficile* colitis, and infectious diarrhea.
11. Discuss measures to prevent or limit the spread of *Clostridium difficile*.
12. List high-risk foods associated with infectious diarrhea.
13. List common sexually transmitted infectious diseases and their treatment.
14. Describe the symptoms, the types of organisms, and treatment for urinary tract infections.
15. Discuss bone and joint infections to include osteomyelitis and septic arthritis.

## Chapter 9: Respiratory-Related Microbiological Diseases

1. Explain why the respiratory system is prone to a host of infectious diseases.
2. Discuss the types of organisms causing infection, clinical presentation, and possible antimicrobial treatments of upper respiratory infections to include sinusitis, pharyngitis, epiglottitis, and croup.
3. Discuss why a throat culture should be obtained in a patient with a sore throat and a negative rapid antigen detection test.

4. List the four Ds of epiglottitis.
5. Discuss the types of organisms causing infection, clinical presentation, and possible antimicrobial treatments of lower respiratory infections to include acute bronchitis, bronchiolitis, pneumonia, tuberculosis, and avian influenza.
6. Discuss acute bronchitis and why antibiotics are not indicated in its treatment.
7. Compare and contrast the various types of pneumonias with respect to the common causative bacteria and the empiric antibiotics for each type.
8. List general categories of risk factors that predispose patients to health care–associated pneumonias.
9. Discuss why directly observed therapy (DOT) for the treatment of tuberculosis may be important to limit the development of antibiotic resistance.
10. Discuss bioterrorism and its relationship to antimicrobial therapy.

### **Completion and Accreditation**

Students who pass the chapter tests with an overall average of 70% or higher will receive a certificate of completion and 3.8 Continuing Education Units (CEUs). One CEU is equivalent to 10 hours of class time.

Corexcel is accredited by the International Association for Continuing Education and Training (IACET) and is authorized to issue the IACET CEU. In obtaining this accreditation, Corexcel has demonstrated that it complies with the ANSI/IACET Standard which is recognized internationally as a standard of good practice. As a result of their Authorized Provider membership status, Corexcel is authorized to offer IACET CEUs for its programs that qualify under the ANSI/IACET Standard.