

Advances in Diagnostics (MMD-993)

Credit Hours 3 (3-0)

Course Description

This course provides a unique opportunity to study how doctors reach conclusions regarding disease prediction, prevention, diagnosis, and optimal treatment regimens. You will learn about multiple diagnostics tools use in practices. The emphasis is on how to select the appropriate analysis methods and technologies to conduct analyses, understand the results and their implications in selected patient diagnoses. The focus areas are clinical chemistry, hematology, diagnostic microbiology, histopathology, molecular diagnostics and diagnostic medical imaging.

Educational Objective

- Demonstrates proper handling of patients/specimens and evaluate situations that may cause adverse issues
- Demonstrate skill with the microscope, centrifuge, and other laboratory equipment
- Demonstrate competence with laboratory mathematics and quality control
- Comply with laboratory safety protocols by demonstrating proper technique
- Renal anatomy and physiology, formation of urine and microscopic identification of elements found in a urine sediment
- Basic understanding and analysis of other body fluids
- Basic understanding of hematology, immunology, clinical chemistry and microbiology with emphasis placed on point of care testing in all areas of the laboratory.
- Correlate abnormal laboratory test results with various disease states

Course Outcomes

Upon successful completion of the course, you will be able to

- Describe disciplines and specimen types within the field of medical diagnostics

- Select appropriate diagnostics tools for specific scenarios
- Present biometrics basics and how these can be utilized to help predict and prevent certain diseases
- Name the most common clinical chemistry and hematology analyses and understand the science behind the analyses
- Give examples of how to diagnose common infections
- Understand the use of histology for clinical diagnostics
- Describe molecular diagnostics tools and their relation to precision medicine

Course Contents

1. Laboratory Safety

- Bloodborne Pathogens
- Chemical Hygiene
- Exposure Control Plan
- PPE, Safety Devices & Techniques –

2. Blood/Specimen Collection & Quality Control

- Renal Anatomy & Physiology
- Physiologic Assessment Using Urinalysis
- Correlating Diseases with Abnormal Results
- Laboratory Procedure: Urinalysis
- Accuracy & Precision
- Statistical Formulas and Implementation
- Statistical Analysis of Laboratory Procedures –

3. Bloodbank, Hematology & Immunology

- Blood Cells
- White Blood Cell Morphology
- Red Blood Cell Morphology
- Laboratory Procedure: Identification of Blood Cells Under the Microscope
- ABO & RH Blood Types
- Laboratory Procedure: ABO/Rh Typing

1. Basic Principles of Clinical Chemistry & Clinical Microbiology

- Clinically Significant Pathogen vs. Normal Flora
 - Bacterial Identification
 - Bacterial Morphology: Gram Stains
 - Laboratory Procedure: Gram Stains
 - Glucose Metabolism and Regulation
 - Diseases Associated with Glucose Metabolism
 - Laboratory Procedure: Glucose Analysis –
2. Infectious Disease –
 3. Molecular Module
 - DNA Isolation
 - Gel Electrophoresis –
 4. Professional Development
 - Importance of Effective Communication in a Clinical Setting
 - Effective Written Communication
 - Effective Verbal Communication

Recommended Books

1. Turgeon, M. L. (2015). *Linne & Ringsrud's Clinical Laboratory Science-E-Book: The Basics and Routine Techniques*. Elsevier Health Sciences.