

# Virginia Western Community College

## MDL 260

### Laboratory Instrumentation

#### **Prerequisites**

BIO 101 and BIO 141 or equivalent.

#### **Course Description**

Teaches the theory, principles of operation, methodologies, maintenance, and troubleshooting of the more common instrumentation used in the clinical laboratory.

**Semester Credits: 2**

**Lecture Hours: 1**

**Lab/Clinical/Internship Hours: 0**

#### **Required Materials**

##### **Textbook:**

**TBD**

Possibly a combination of

- *Chapters from textbooks utilized in prior courses along with current literature*
- *Applicable sections from Henry's Clinical Diagnosis and Management by ...*
- *Clinical Laboratory Instrumentation and Automation: Principles, Applications, and Selection 1st Edition. Kory M. Ward PhD MT(ASCP) (Author), Craig A. Lehmann PhD CC(NRCC) (Author), Alan M. Leiken PhD (Author)*

##### **Supplementary Materials:**

#### **Course Outcomes**

**At the completion of this course, the student should be able to:**

- Have an understanding of the clinical laboratory instrumentation basic theory and application.
- Apply knowledge from theories and methodologies to understand the principles of operation of currently and routinely used analyzers in clinical laboratories.
- Understand safety relating to laboratory instrumentation.
- Understand specimen requirements and processing.
- Understand equipment preventative maintenance, quality control and requirements for quality assurance.

- Apply knowledge and be able to perform basic maintenance on clinical laboratory analyzers.
- Apply knowledge and be able to understand requirements for procurement, installation, qualification/ validation and equipment upgrades.
- Understand and discuss error detection and troubleshooting for common clinical laboratory analyzers

## **Topical Description**

### **Part 1: Background and History**

- Safety
- General Laboratory Equipment and Reagents
- Specimen Requirements and Processing
- Overview of Laboratory Instruments
- Overview of Instrumentation Methodologies

### **Part 2: Testing Methodologies**

- Spectrophotometry
- Reflectometry
- Molecular Luminescence Spectrophotometry – Fluorometry
- Nephelometry and Turbidimetry
- Refractometry
- Osmometry
- Flow Cytometry
- Electrochemistry
- Conductance
- Electrophoresis and Densitometry
- Impedance
- Isoelectric Focusing
- Chromatography
- Mass Spectrometry
- Scintillation Counter
- Capillary Electrophoresis
- Nuclear Magnetic Resonance

### **Part 3: Automation**

- Principles and Components of Automation

### **Part 4: Additional Topics**

- Error Detection and Troubleshooting Instrumentation
- Instrumentation Efficiency and Cost
- Emerging Technologies

**Note to Instructors**