

**J. Sargeant Reynolds Community College
Course Content Summary**

Course Prefix and Number: MDL 243 **Credits:** 2

Course Title: Introduction to Clinical Molecular Diagnostics

Course Description:

Provides the fundamentals of genetics and inheritance along with an overview of the basic principles of clinical molecular diagnostics. Discusses the use of common molecular techniques in the diagnosis of disease. Lecture 2 hours per week.

General Course Purpose:

Introduces basic concepts and techniques used in molecular diagnostics, including nucleic acid function and structure, human genetics; DNA structure; nucleic acid isolation, identification and isolation techniques; and components of the clinical application of molecular diagnostics

Course Prerequisites and Co-requisites:

Must be in the final year of the Medical Laboratory AAS degree program or have program approval.

Student Learning Outcomes:

Upon completing the course, the student will be able to

- Describe chromosome function and structure
- Discuss the basic principle of genetics
- Describe the structure/ purpose of nucleotides and how they relate to amino acid formation
- Describe chromosomal structure mutations
- Describe methods for nucleic acid extraction and detection
- Discuss the amplification of DNA and RNA
- Summarize techniques used in the molecular diagnostics laboratory
- List and describe the methods for analysis and characterization of nucleic acids and proteins
- State quality assurance and quality control measures required in molecular diagnostics

Major Topics to Be Included:

- History of Molecular diagnostics
- Chromosome structure and function
- Nucleic acid: structure/ organization/ physiology/ regulation
- Genetic alterations and mutations
- Nucleic acid isolation/ amplification/ identification
- Restriction enzymes and hydration techniques
- Electrophoresis
- DNA sequencing
- Specimen collection/ handling/ Quality Assurance issues in the molecular lab
- Molecular testing of infectious disease and microorganisms

- Molecular Oncology

Effective Date/Updated: October 26, 2022