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. Total 2 hours per week.

General Course Purpose

The purpose of this course is to introduce the student to the basics concepts and techniques used in molecular diagnostics. Topic to be covered include: history of molecular concepts; nucleic acid function and structure; human genetics; DNA structure; nucleic acid isolation; identification and amplification techniques; and components of a clinical molecular diagnostics laboratory.

Course Prerequisites/Co-requisites

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

Course Objectives

Upon completing the course, the student will be able to:

- Describe chromosome function and structure
- Discuss the basic principles of genetics
- Describe the structure and 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 the required quality assurance and quality control measures required in a molecular diagnostics laboratory

Major Topics to be Included

History of molecular diagnostics
Chromosome structure and function
Nucleic acid structure and organization
Nucleic acid physiology and regulation
Genetic alterations and mutations
Nucleic acid isolation
Nucleic acid amplification
Nucleic acid identification
Restriction enzymes and hybridization techniques
Electrophoresis
DNA sequencing
Specimen collection and handling & quality assurance issues in the molecular lab
Molecular testing of infectious disease and microorganisms
Molecular oncology