

# Minnesota State College Southeast

## MEDL 2000: Introduction to Cellular and Molecular Diagnostics

### A. COURSE DESCRIPTION

Credits: 3

Lecture Hours/Week: 2

Lab Hours/Week: 1

OJT Hours/Week: \*.\*

Prerequisites:

This course requires the following prerequisite

BIOL 1200 - Human Biology

Corequisites: None

MnTC Goals: None

Introduction to Cellular and Molecular Diagnostics will introduce the student to the concepts of cellular and molecular biology including the structure, function, and reproduction of cells and microorganisms. The course will cover basic microbiological laboratory techniques including staining, plating, microbial growth, microbial nutrition, microbial isolation, and basic identification. Fundamental concepts in genetics will be covered to facilitate the understanding of current molecular testing methodologies. The student will explore the use of molecular testing methodologies in the laboratory to monitor and diagnose disease. (Prerequisites: BIOL1200) (3 credits: 2 lecture/1 lab)

**B. COURSE EFFECTIVE DATES:** 01/23/2020 - Present

### C. OUTLINE OF MAJOR CONTENT AREAS

1. Eukaryotic and Prokaryotic Cell Biology
2. Introduction to Microorganisms
3. Laboratory Manipulation of Microorganisms
4. Fundamentals of Genetics
5. Molecular and Cellular Diagnostics in the Clinical Laboratory

#### **D. LEARNING OUTCOMES (General)**

1. Describe how organisms are classified.
2. Compare and contrast eukaryotes to prokaryotes including: size, internal and external structures, reproductive strategies, and potential for human disease.
3. Describe microorganisms including fungi, yeast, helminths, protozoan and single cells organisms, bacteria, viruses, and other noncellular infectious agents.
4. Discuss microbial nutrition, the influence of environmental factors, and basic metabolism.
5. Illustrate microbial growth curves.
6. Explain how to culture microorganisms in the laboratory including media, temperature, and plating techniques.
7. Describe the importance of aseptic technique.
8. Summarize staining techniques for use in differentiation of microorganisms.
9. Discuss physical and chemical control of microorganisms.
10. Describe the structure and function of DNA and RNA, genes, chromosomes, and plasmids.
11. Illustrate the process of transcription and translation.
12. Describe recombination and horizontal gene transfer.
13. Describe the use of molecular diagnostic methods in the laboratory.
14. Discuss nucleic acid extraction and detection.
15. Explore techniques for hybridization and amplification of nucleic acids.
16. Discuss chromosomal and gene mutation detection in the laboratory.
17. Describe DNA sequencing and the human genome project.
18. Discuss the use of molecular diagnostics in various departments in the laboratory.
19. Describe the use of cellular diagnostics in the laboratory.
20. Discuss sample collection for molecular testing.
21. Discuss quality assurance and quality control in molecular testing.

#### **E. Minnesota Transfer Curriculum Goal Area(s) and Competencies**

None

#### **F. LEARNER OUTCOMES ASSESSMENT**

As noted on course syllabus

#### **G. SPECIAL INFORMATION**

None noted