Common Course Outline

MLTC 151

Immunological and Molecular Diagnostics

2 Credits

Community College of Baltimore County

Description

MLTC 151 – Immunological and Molecular Diagnostics presents the principles of immunology including the organization and function of the immune system, antigens and antibodies, humoral and cell-mediated immunity, hypersensitivity, complement system, and disorders of the immune system. The course also introduces the theoretical and practical concepts in molecular diagnostics. Topics will include the history of molecular concepts, fundamentals of genetics and inheritance, nucleic acid function and structure and identification and amplification techniques. Exercises will consist of an overview of laboratory techniques used to detect inherited disorders, cancer, and infectious diseases utilizing both immunological and molecular techniques.

2 Credits

Prerequisites: MLTC 101; Admission to the Medical Laboratory Technology Program
Co-requisite: MLTC 150

Overall Course Objectives

Upon completion of this course students will be able to:

1. describe the cells involved in cellular and humoral immunity and contrast their roles;
2. list the five types of immunoglobulins;
3. compare and contrast the inflammatory process, innate and adaptive immunity, and the cells and immune factors involved in each;
4. list the types of hypersensitivity reactions and give examples of each;
5. describe general immunologic principles of serological testing methods;
6. interpret anti-nuclear antibody patterns for autoimmunity classification;
7. describe chromosome function and structure;
8. describe the basic principles of genetics;
9. describe the structure and purpose of nucleotides and how they relate to protein formation;
10. describe chromosomal mutations;
11. describe methods for nucleic acid extraction and detection;
12. summarize the amplification of DNA and RNA;
13. summarize techniques used in the molecular diagnostics laboratory;
14. list and describe the methods for analysis and characterization of nucleic acid and proteins; and
15. state the quality control/assurance measures used in serology and molecular testing.

Major Topics

I. Immunology
   A. Natural and acquired (innate and adaptive) immunity
   B. Phagocytosis and inflammation
   C. Primary and secondary immune responses
   D. Characteristics of antigens
   E. Structure and production of immunoglobulins
   F. Complement system
   G. Hypersensitivity reactions
   H. Immunodiagnostics
      i. Syphilis serology (Rapid plasma regain testing)
      ii. C-Reactive protein (C-RP)
      iii. Streptococcal antibody test (ASO)
      iv. Viral infectious diseases (Epstein-Barr virus, Rubella, Cytomegalovirus, Human Immunodeficiency virus [HIV], Hepatitis A, B, C, D, and E)
      v. Autoimmune Diseases (Rheumatoid Arthritis and Systemic Lupus Erythematosus)

II. Molecular Techniques
   A. History of molecular diagnostics
   B. Chromsome structure and function
   C. Nucleic acid structure and organization
   D. Nucleic acid physiology and regulation
   E. Genetic alterations and mutations
   F. Nucleic acid isolation
   G. Nucleic acid amplification
   H. Nucleic acid identification
   I. Restriction enzymes and hybridization techniques
   J. Electrophoresis
   K. DNA sequencing
   L. Western blots and immunodot/blot assays
   M. Molecular testing of infectious diseases and microorganisms
   N. Molecular oncology

Course Requirements

Grading procedures will be determined by the individual faculty member but will include the following:

Grading/exams

- A minimum of three (3) graded case studies
- Weekly quizzes and assignments
- A minimum of three (3) exams
- Professionalism
- A cumulative final examination

Written Assignments: Students are required to use appropriate academic resources.

Other Course Information

This course is a Medical Laboratory Technology program core course.
This course is part of a program sequence that requires admission to the program.
This course is offered in the fall only.

Date Revised: 01/09/2018