SPRINGFIELD TECHNICAL COMMUNITY COLLEGE

ACADEMIC AFFAIRS

Course Number: MLT-216 Department: Clinical Lab Science

Course Title: Immunology/Immunohematology Semester: Fall Year: 2021

COURSE OBJECTIVES: The student will have a thorough understanding of immunology principles as they relate to the clinical laboratory as well as serological techniques and practices. Students will explore the field of immunohematology and have a basic understanding of clinically significant blood groups, unexpected antibodies, and testing protocol used in the clinical blood bank lab. Students will also become familiar with the blood donation process and specialized criteria for identification and acceptability of donors.

Prerequisite MLT-118, 120, 124 & 126 Co-Requisite MLT-216L

Student Learning Outcomes

Topic	Learning Outcome
Immunology	***Introduction to immunology*** The student will be able to: • distinguish between innate and adaptive immunity, cellular and humoral immunity, and active and passive immunity • characterize the 5 immunoglobulin types found in humans and discuss their structure • List factors involved with the antigenicity of a substance
	Processes of Innate Immunity • list the types of granulocytes and mononuclear cells involved in innate immunity • describe the function of each cell and instances in which they are elevated • list the steps in the process of phagocytosis • explain the importance of phagocytosis in both natural and acquired immunity • describe the process of inflammation • list the acute phase reactants involved in innate immunity

	Processes of Adaptive Immunity • describe the role of B cells and T cells in immunity • define the MHC and discuss their function in regards to T cell activation • discuss the differences between class I and class II molecules and their roles in adaptive immunity • Describe how the HLA typing is determined • Describe how the HLA type is important in transplant medicine • identify the components of the complement system • discuss the complement activation pathways • describe the effects of increased or decreased complement on the immune system
	Immunologically related disorders • describe the general characteristics of autoimmune disorders • describe the role of the immune system in autoimmune disorders • describe the types and mechanisms of hypersensitivity • describe the specific laboratory tests to diagnose SLE and RA • describe the various fluorescent ANA patterns in the diagnosis of SLE
	Immunodeficiencies and Immunoproliferative diseases • differentiate between primary and secondary immunodeficiences and list some causes of each • Describe the laboratory techniques and technology used to classify immunoproliferative diseases • Discuss the most current ways in which the immune system can be manipulated to treat tumors in humans.
Preparing for Immunohematology	***Specimen Collection*** • List the types of specimens received in the blood bank laboratory • List the tests that may be performed on anticoagulated blood and which may not and explain why • Describe the identification procedures that must be adhered to
	Genetics • Prepare an inheritance chart and label the meaning of all symbols • State the definition of phenotype vs. genotype • Discuss the concepts of recessive and dominant traits in regards to inheritance • Interpret a sex-linked inheritance chart and explain whether sons or daughters will inherit the trait. • Discuss genes and alleles and how they relate to inheritance • Determine genotypes for offspring using Punnett squares •

Blood Groups	ABO System	• List the possible genotypes for each ABO phenotype • State which chromosome(s) ABH genes are located on • Determine which sugars on the RBC are responsible for gene expression • Describe how ABO antigen type determines the ABO antibody in the serum • List the reagents and patient cells/serum that are added to each tube for testing • List common reasons for discrepancies in ABO testing and determine which type of blood should be given if a discrepancy is found • Explain the secretor test and interpret results
	RH System	• Discuss the relation of the D antigen to Rh status • Describe the different types of nomenclature and be able to translate between the three methods • Categorize Rh antibodies as IgG or IgM immunoglobulins and discuss how they are formed • Summarize the procedure for Rh testing including Weak D testing • List all reagents used in Rh testing and describe control reagent
	Other Blood groups	• List the other RBC antigen groups including Kell, Duffy, Kidd, Lewis, Ii, MNS, and Diego • Using class notes, complete a chart that describes the antigens, antibodies, inheritance, fetal development and clinical significance • Describe what is unique to each blood group • Define dosage and give an example of its application to antibody testing
Pre-Transfusion functions	Pre-Transfusion Testing	• Understand the importance of patient identification in blood bank testing • List the reagents used in the antibody screen and their uses • Understand the concept of heterozygous and homozygous cells • Explain the difference between the IAT and DAT • List uses for each test • Define zeta potential and how it is related to agglutination • Determine the blood type and number of cells used for panels • Observe/explain gel testing techniques • Understand how clinical significance is related to type of immunoglobulin and reaction temperature • Practice and demonstrate the Elimination method • Define other techniques such as: enzyme treatment, elution, adsorption, and absorption • Explain the different types of crossmatches and when they are used: Immediate spin, Abbreviated, Antiglobulin, and Computer List, in order of preference, which type RBC unit would be used for each patient

	Blood Collection	• Demonstrate patient identification procedure in the blood bank • Demonstrate specimen labeling criteria in the blood bank • Recognize normal ranges for pre-collection testing results • List the serology tests performed on blood products • List the components of the donor screening process • List the conditions that require permanent or temporary deferral of a blood donor • Determine the volume of blood drawn for a unit of blood Give an example of confidentiality issues that may occur with blood donation, and describe how the issue may be resolved
	QA/QC	• Explain daily QC procedures in blood bank in relation to testing and storage • Describe temperature charts and discuss their importance in the blood bank
	Transfusions	• List the possible adverse affects of transfusions and explain how they may occur • List and define the different types of transfusion reactions including; IHTR, febrile, urticaria, bacterial, and DHTR • List and explain the steps in a post-transfusion reaction workup • Determine the type of post-transfusion specimen(s) needed for a reaction workup • List and define the different types of transfusion including: autologous, intrauterine, and exchange • Give an example in which you would use each type of transfusion
	Hemolytic Disease of the Newborn	• Describe how HDN occurs • List the antibodies most commonly responsible for the disease • Describe common testing methods form fetal-maternal bleeding including the rosette test and Kleihauer-Betke • Define Rhogam and explain when it is given to mothers • Relate dosage of Rhogam to volume of FMH