

SPRINGFIELD TECHNICAL COMMUNITY COLLEGE

ACADEMIC AFFAIRS

Course Number: MLT-126 Department: Clinical Lab Science
Course Title: Clinical Chemistry Semester: Fall Year: 2021

COURSE OBJECTIVES: The student will have an understanding of the mechanisms of both the Hematopoietic and the hemostatic systems. The student will demonstrate the proper method for safe blood collection and for the handling and processing of such specimens. The student will know the principle reference intervals/normal values, the clinical significance of lab test results, and the sources of error associated with both routine and specialized hematologic tests. The student will be able to differentiate the **normal** from the **abnormal** specimen, given the pre-established criteria. Prerequisite MLT-110 & 112 Co-Requisite MLT-212L

Objectives/Competencies

Course Objective	Competencies
Upon the completion of each lecture section, the student will be able to fulfill the section objectives as outlined in the assigned text and materials and/or defined by verbal instruction to the level identified in the MLT Program Matriculation Policy.	
Basic components of blood (formation and function), Common Hematology specimens and Safety Practices in the Hematology	<ul style="list-style-type: none">• Describe the function of hematology and the relationship to hematology results in the diagnosis of disease.• Differentiate the terms plasma and serum.• Explain blood composition and component functions.• Identify the types of specimens analyzed within the hematology laboratory and the testing performed on each specimen type.• Describe the process of specimen handling and possible variability in specimens.• Discuss the safety policies and procedures used in the Hematology laboratory to include: universal precautions, PPE, safe needle standards, etc.
Molecular Genetics, Cellular Morphology and Hematopoiesis	<ul style="list-style-type: none">• Name and describe the structure and function of cytoplasmic organelles.• Explain the principles of mitosis, meiosis and apoptosis.• Explain the origin of blood cells and trace the sequential sites of cellular proliferation and development.• Name and state the function of hematopoietic growth factors.• Name the cells in the developmental order that will mature into erythrocytes, thrombocytes, plasma cells and the 5 leukocyte types.• Describe the nuclear and cytoplasmic characteristics of blood cells and describe how each characteristic is used to identify each type of blood cell.

<p>Erythropoiesis and Erythrocyte Morphology and Inclusion</p>	<ul style="list-style-type: none"> • Describe the development of erythrocytes including growth factors, sites of development and cells stage characteristics. • Describe and perform the process of a reticulocyte count and the mathematical calculation. • Discuss characteristics, formation and function of hemoglobin. • Identify the structure of normal and abnormal forms of hemoglobin molecules. • Describe the characteristics and metabolic activities of erythrocytes. • Discuss the principle and perform procedure for all manual hematology tests used to assess erythrocytes. • Define and perform laboratory calculations to determine MCH, MCV and MCHC. • Discuss normal RBC morphology vs. abnormal RBC morphology and inclusions. • Analyze erythrocytes, identifying morphological abnormalities and correlate possible associated clinical conditions.
<p>Classification and Assessment of Anemia & Hemoglobinopathy</p>	<ul style="list-style-type: none"> • Define and discuss the clinical manifestations and clinical findings for all anemias. • Define and discuss the clinical manifestations and clinical findings for all hemoglobinopathies. • Analyze erythrocytes, identifying morphological abnormalities and correlate possible associated clinical conditions.
<p>White Blood Cell Development</p>	<ul style="list-style-type: none"> • Discuss the maturation and development of granulocytic, thrombocytic, lymphocytic, and monocytic cell lines. • Describe morphologic changes during cell development. • Describe the function of all leukocytes. • Discuss principles and procedures for all manual hematology tests used to assess leukocytes.
<p>Non-malignant Leukocytic Disorders</p>	<ul style="list-style-type: none"> • Identify normal vs. abnormal leukocyte morphology. • Discuss morphological abnormalities of mature leukocytes. • Recognize various WBC inclusion bodies, and discuss their clinical significance. • Name and define non-malignant disorders associated with leukocytes • Describe the characteristic finding in non-malignant disorders associated with leukocytes. • Define leukocytosis and leukocytopenia. • Analyze leukocytes, identifying morphological abnormalities and correlate with possible associated clinical conditions.
<p>Leukemia and Lymphoma</p>	<ul style="list-style-type: none"> • Define the general characteristics and types of leukemias. • Define and discuss the clinical manifestations, findings and classifications for all leukemias. • Describe the methods of cellular identification and the reactions of the various cell types. • Describe the method of immunophenotypic identification of various cell types. • Analyze leukocytes and other related cells, identifying morphological abnormalities and correlate possible associated clinical conditions. • Define and discuss the clinical manifestations, findings and classifications for all lymphomas.

<p>Chronic Myeloproliferative Neoplasms</p>	<ul style="list-style-type: none"> • Define and discuss the clinical manifestations, findings and classifications for all myeloproliferative disorders. • Analyze leukocytes and other related cells, identifying morphological abnormalities and correlate possible associated clinical conditions.
<p>Myelodysplastic Syndrome(MDS) & Myelodysplastic/ Myeloproliferative Neoplasms</p>	<ul style="list-style-type: none"> • Define and discuss the clinical manifestations, findings and classifications for all myelodysplastic disorders. • Analyze leukocytes and other related cells, identifying morphological abnormalities and correlate possible associated clinical conditions.
<p>Coagulation Principles of Hemostasis and Thrombosis</p>	<ul style="list-style-type: none"> • Define hemostasis and vasoconstriction. • Describe the role of the endothelium in the Thrombotic response. • List the blood coagulation factors. • Discuss the role of the platelet in hemostasis. • Discuss the normal protective mechanisms against thrombosis. • Describe “intrinsic” and “extrinsic” pathways. • Discuss prothrombin time and which factors are measured: • Discuss use of PT in coagulation therapy. • List factors measured by PTT. • Describe clinical use of PTT. • Describe uses of laboratory testing in the differentiation of coagulative disorders. • Discuss the use of photo-optical methods in coagulation testing.
<p>Disorders of Hemostasis and Thrombosis</p>	<ul style="list-style-type: none"> • Define purpura and conditions that may produce this state. • List three causes of thrombocytopenia. • List causes of thrombocytosis, and give examples of each. • Describe conditions that would produce a bleeding disorder. • Define the hypercoagulable state. • Discuss role of platelets in hypercoagulable state. • Describe the relationship between impaired fibrinolysis and protein C, antithrombin III and plasminogen. • Analyze clinical findings and correlate them with clinical conditions.
<p>Current Topic Articles and Case Studies Review & Disease Fact Sheet Oral Presentations</p>	<ul style="list-style-type: none"> • Read and summarize major points of a current journal article that relates to the areas of hematology and coagulation analysis. • Identify the impact of new developments on this area of the laboratory or on patient care. • Analyze case studies with attention to problem solving and trouble shooting. • Research and report on one hematology or coagulation disorder.