



South Central College

# MDLT 1815 Hematology I

## Course Outcome Summary

### Course Information

<b>Description</b>	This course covers basic Hematology procedures involving such tests as red cell counts, white cell counts, platelet counts, hemoglobin determination, hematocrits, sedimentation rates, and reticulocyte counts. Also covered are the abnormalities of these elements which cause diseases, and bone marrow procedures. (MDLT 1810 may also be taken concurrently or with Program Director permission.)
<b>Total Credits</b>	3
<b>Total Hours</b>	64

### Types of Instruction

#### Instruction Type

#### Credits/Hours

Online Lecture

Laboratory

### Pre/Corequisites

MDLT 1810 may also be taken concurrently or with Program Director permission.

### Institutional Core Competencies

Communication - Students will be able to demonstrate appropriate and effective interactions with others to achieve their personal, academic, and professional objectives.

Critical and Creative Thinking - Students will be able to demonstrate purposeful thinking with the goal of using a creative process for developing and building upon ideas and/or the goal of using a critical process for the analyzing and evaluating of ideas.

### Course Competencies

#### 1. Apply laboratory safety practices.

##### Learning Objectives

Explain management and disposal of hazardous and regular waste.

Discuss management of a safe laboratory environment.

Describe collection, transportation, handling, packaging, processing precautions of hematology specimens.

Describe the practice of disinfection.

#### 2. Explain, discuss, and demonstrate proper Hematology specimen collection, transportation, and

**processing procedures, and common preanalytical variables that affect them.**

**Learning Objectives**

List and explain the common types of hematology specimen collection, transportation, and processing procedures.

Discuss common preanalytical variables that affect hematology collection, transportation, and processing.

**3. Discuss and demonstrate the methods used for making/staining/examining peripheral blood smears.**

**Learning Objectives**

List the specimen sources and collection processes used to that are acceptable for peripheral blood smear preparation.

Describe the techniques used for making peripheral blood smears.

Explain the principle, purpose, and basic method of Wright staining of peripheral blood smears.

**4. Demonstrate standard quality assurance practices to ensure quality patient outcomes.**

**Learning Objectives**

List components and related terminology of a hematology QA program.

Interpret QA data.

Discuss using and reporting QA data.

Discuss corrective action measures for QA data.

**5. Describe the qualities of a well prepared, well stained peripheral blood smear, and common troubleshooting procedures of poorly made/stained smears.**

**Learning Objectives**

Describe the qualities of a well made peripheral blood smear, recognize a description of slide that is consistent or inconsistent with that appearance, and troubleshoot problems with poorly prepared smears.

Identify and troubleshoot problems that cause poorly stained blood smears.

**6. Describe the proper examination of a peripheral blood smear, including selection of "correct" area, sequence of examination, and observations made at each magnification. Recognize deviations from this protocol.**

**Learning Objectives**

Apply a systematic approach to the examination of peripheral blood smears.

Give the number of cells observed per field and the magnification of the objective.

Apply formulas to estimate WBC and platelet counts.

Explain the affect that platelet satellitosis and platelet clumping have on automated complete blood counts (CBC).

Recognize examples of samples that would be consistent with this.

Interpret CBC data that results in a verbal summary of the numerical data and communicates the peripheral blood picture accurately.

Calculate absolute WBC differential counts.

**7. Discuss and describe the general components, function, and chemical composition of cells and their membranes visible by light microscopy.**

**Learning Objectives**

List and describe the components of the nucleus.

Correlate nuclear structures to the activities of the cell.

Name and describe the ultrastructures of the cytoplasmic organelles found in the cell

Correlate the cytoplasmic structures to the activities of the cell.

**8. Discuss hematopoiesis and the stem cell theory of hematopoiesis.**

**Learning Objectives**

Define hematopoiesis.

Discuss the evolution and formation of blood cells from embryo to adult, including anatomic sites.

Explain the stem cell theory, including the names of various stem cells and progenitor cells and their lineage associations.

Describe general morphologic changes that occur during cell maturation.

Define apoptosis.

Discuss the roles of various cytokines and hematopoietic growth actors in the process of hematopoiesis.

**9. Define, list, and discuss leukopoiesis, the general and specific function, maturation sequence, related terminology, and reference ranges, including nuclear and cytoplasmic alterations.**

**Learning Objectives**

Define and discuss related terminology of the five types of leukocytes (WBCs) based on site of origin, general and specific functions, interrelationships and morphology.

Explain the differentiation sequence required for the production of the five types of leukocytes (WBCs).

Compare and contrast the nuclear and cytoplasmic morphology changes of the five types of leukocytes (WBCs) during the various stages of immunologic activities.

Describe the stages of granulocytic development, including special characteristics that identify the maturation stage of the cell.

Cite normal reference ranges for leukocytes (WBCs).

**10. Define, list, and discuss erythropoiesis, composition and functions, maturation sequence, related terminology, reference ranges, and destruction of the erythrocytes (RBCs).**

**Learning Objectives**

Define erythropoiesis.

List and discuss the erythroid precursors in order of maturity, including the morphologic characteristics, related terminology, normal location, and length of time spent in each stage.

Explain the role of erythropoietin in the production of erythrocytes (RBCs).

Define and discuss the role of apoptosis in the destruction of erythrocytes (RBCs).

Cite the normal reference range for erythrocytes (RBCs).

**11. Discuss metabolism of the erythrocyte (RBCs).**

**Learning Objectives**

List and discuss the red blood cell (RBC) processes that require energy.

Explain the function(s) of the erythrocytes (RBCs).

Cite the survival time of erythrocytes (RBCs) in the peripheral blood circulation.

**12. Discuss metabolism of hemoglobin (Hgb/Hb).**

**Learning Objectives**

Describe the overall general quaternary structure of the hemoglobin molecule, including the role/function of each component.

Discuss the biosynthesis and assembly of the hemoglobin molecule.

List the three types of normal hemoglobin in adults and their reference ranges.

Discuss the ontogeny of hemoglobin (Hgb/Hb) with emphasis on newborn and adult hemoglobin .

Discuss regulation of hemoglobin (Hgb/Hb) production

Discuss the role and function of hemoglobin (Hgb/Hb) in maintaining body functions, including shift changes in the oxygen dissociation curve.

List and describe alternate forms of hemoglobin (Hgb/Hb).

**13. Discuss metabolism of Iron (Ir).**

**Learning Objectives**

Discuss the role of iron (Ir) as an essential nutrient for human survival

Discuss the mechanism of iron (Ir) absorption and distinguish between the absorption of heme and nonheme.

Discuss regulation and excretion of iron (Ir).

Discuss circulation, transportation and storage of iron (Ir) in the human body.

Identify and discuss the common laboratory tests currently used to assess iron (Ir) in the body, including their normal reference ranges.

**14. Discuss stimulation for maturation, composition and function(s), related terminology, counts and estimation, reference ranges, and satellitism of the thrombocyte (Platelets).**

**Learning Objectives**

List and discuss the thrombocyte (Platelets) precursors in order of maturity, including the morphologic characteristics, related terminology, normal location, and length of time spent in each stage.

Define and discuss the role of thrombopoietin in the production of thrombocytes (Platelets).

Cite normal the reference range and survival time in the peripheral blood circulation for thrombocytes (Platelets)

List, describe and explain the roles of the anatomical structures of the platelet.

Discuss the function of platelets in the human body, including adhesion, aggregation, and secretion.

Explain the affect that platelet satellitosis and platelet clumping have on automated complete blood counts (CBC) and estimations. Recognize examples of samples that would be consistent with this.

**15. Discuss and demonstrate routine common manual hematology testing including manual WBC cell counts, erythrocyte sedimentation rates (ESR) and reticulocyte counts, including equipment used, principles of procedures, reference ranges, sources of error, and analytical variables.**

**Learning Objectives**

Describe performance and demonstrate manual WBC counts, including types of diluting fluids, typical dilutions, typical area counted in the hemocytometer.

Calculate manual WBC counts when given appropriate data.

Discuss, describe and perform the principle of a Westergren erythrocyte sedimentation rate (ESR). State its diagnostic value and normal female, male, and child and reference ranges.

List and describe common sources of error and conditions that affect ESR rate results.

Describe the principle, procedure, and sources of error for performing a manual reticulocyte count State the clinical value of the test.

Cite normal the reference range and survival time in the peripheral blood circulation for reticulocytes.

Discuss the necessity of calculating relative, absolute, and corrected reticulocyte values and a reticulocyte production index.

**16. Discuss bone marrow characteristics, indications, common locations, aspiration and biopsy, procedure, and reporting.**

**Learning Objectives**

List sites for bone marrow aspiration.

Discuss indications for bone marrow sampling.

Describe the procedure for bone marrow aspirate and biopsy.

Describe in general, the characteristics of bone marrow hemapoietic cells, including aspirate, cytologic and core biopsy samples.

List and discuss the three components of a bone marrow review and the importance of a systematic approach to bone marrow review in total patient assessment.

**SCC Accessibility Statement**

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