

## HIBBING COMMUNITY COLLEGE COURSE OUTLINE

**COURSE NUMBER & COURSE TITLE:** MLT 1412: Hematology 1

**CREDITS:** 3 (2 Lec/ 1 Lab)

**PREREQUISITES:** College level reading is required

### **CATALOG DESCRIPTION:**

This course introduces students to fundamental concepts in hematology including red blood cell development, normal physiology of red blood cells, and red blood cell disorders. The laboratory component complements the lecture and includes microscopic examination of blood and bone marrow slides and common laboratory testing by both manual and automated methods. Phlebotomy skills are introduced and are integrated throughout the course.

### **OUTLINE OF MAJOR CONTENT AREAS:**

- I. Red Blood Cell Morphology and Inclusions
- II. Classification and Laboratory Assessment of Anemia
- III. Principles of Blood Collection

### **COURSE GOALS/OBJECTIVES/OUTCOMES:**

Students will

1. list the components of a complete blood count (CBC).
2. recognize normal values in an automated CBC.
3. describe the internationally accepted method for hemoglobin analysis.
4. given pertinent laboratory data, calculate red blood cell indices (MCV, MCH, MCHC) and interpret the results.
5. differentiate between normocytes, microcytes, and macrocytes.
6. differentiate between normochromic and hypochromic red blood cells.
7. describe the clinical conditions that may produce polychromatic red cells and elevate the reticulocyte count.
8. define anisocytosis and poikilocytosis.
9. describe the abnormal red cell morphology and correlate common clinical conditions associated with: acantocytes, burr cells, elliptocytes, schistocytes, sickle cells, spherocytes, stomatocytes, nucleated red cells, and target cells.
10. describe the abnormal red cell morphology and correlate common clinical conditions associated with the following red cell inclusions: basophilic

- stippling, Cabot rings, Heinz bodies, Howell- Jolly bodies, Pappenheimer bodies, hemoglobin C crystals, Heinz bodies.
11. explain the proper technique for preparing bone marrow specimens.
  12. identify the two most common causes of anemia.
  13. describe the symptoms of anemia.
  14. explain the mechanism, clinical, and laboratory findings of anemia following acute blood loss.
  15. explain the red cell indices related to the microcytic anemias.
  16. summarize the significant laboratory findings in the anemia associated with iron deficiency.
  17. list the significant laboratory findings in sideroblastic anemia.
  18. explain the significant laboratory findings in anemia of chronic disease.
  19. describe the red cell indices related to the macrocytic anemias.
  20. compare and contrast the pathophysiology of macrocytic anemia due to folic acid deficiency and pernicious anemia.
  21. describe the red cell indices related to normocytic anemias.
  22. name three Inherited abnormalities in the red cell membrane that can lead to hemolytic anemia.
  23. compare and contrast the peripheral smear findings in hereditary stomatocytosis, hereditary elliptocytosis, and hereditary spherocytosis.
  24. explain the etiology, symptoms, and laboratory finding for paroxysmal nocturnal hemoglobinuria.
  25. discuss the common hematological findings in hemolytic anemias.
  26. describe the etiological basis for G6PD and pyruvate kinase deficiency.
  27. compare and contrast the peripheral smear findings in G6PD and pyruvate kinase deficiency
  28. describe the etiological basis of aplastic anemia.
  29. summarize the significant laboratory findings in aplastic anemia.
  30. identify the amino acid substitution in sickle cell disease.
  31. explain the inheritance patterns of sickle cell disease.
  32. list the significant laboratory findings associated with sickle cell disease, hemoglobin C, and hemoglobin E disease.
  33. describe the red blood cell indices associated with thalassemia syndromes.
  34. explain the basic pathophysiological defect in the thalassemia syndromes.
  35. compare and contrast the clinical manifestations of alpha thalassemia minor (trait) and alpha thalassemia major (Hydrops Fetalis ) and beta thalassemia minor (trait) and beta thalassemia major (Cooley's Anemia ).
  36. list the abnormal hemoglobins associated with alpha thalassemia major and beta thalassemia major.
  37. correlate laboratory data with patient case studies.
  38. apply prior knowledge to problem solving including recognition of abnormal or unusual test results, recognition of unacceptable quality

- control results, and verification of test results.
39. describe the equipment used for venous blood collection.
  40. identify and select suitable venipuncture and capillary sites.
  41. compare the color codes of evacuated tubes with the additive contained in each tube.
  42. discuss site selection in regard to: burn patients, IVs, patients with AV shunts or dialysis canulas, arterial lines, and mastectomy.
  43. describe special considerations for pediatric and geriatric patients in the collection of a blood specimen.
  44. explain the importance of draw order to specimen integrity.
  45. list 3 phlebotomy complications and describe the symptoms and treatment for each type of complication.
  46. perform the venipuncture process including:
    - proper patient identification procedures
    - proper equipment selection and use
    - proper specimen labeling procedures
    - patient care following completion of venipuncture
    - safety and infection control procedures
    - proper disposal of all used equipment

### **Psycho-Motor Objectives:**

At the conclusion of this course, the student will be able to:

1. perform manual reticulocyte counts, demonstrate the calculations, obtaining results that are within 10% of instructor's results.
2. given pertinent laboratory values for hemoglobin, hematocrit, and red cell count, calculate RBC indices.
3. evaluate blood smears for RBC morphology and inclusions. Students must score at least 70% on a Practical Evaluation of at least 10 unknowns (see course syllabus for grading criteria).
4. demonstrate and perform safe, customer friendly venipuncture and skin puncture procedures by five successful venipunctures and at least one successful finger-stick procedure. (Phlebotomy skill development continues on through other classes).
5. demonstrate safe and professional work habits. Student is expected to follow laboratory safety procedures consistent with OSHA and Laboratory policy.

### **HCC COMPETENCIES MET:**

Working Productively & Cooperatively

Thinking Creatively and Critically

**STUDENT CONTRIBUTIONS:**

Students are expected to participate in class lectures, complete all labs and assignments on time, and spend the necessary study time to pass all quizzes and exams.

**STUDENT ASSESSMENT SHALL TAKE PLACE USING INSTRUMENTS SELECTED/DEVELOPED BY THE COURSE INSTRUCTOR.**

**SPECIAL INFORMATION: (SPECIAL FEES, DIRECTIVES ON HAZARDOUS MATERIALS, ETC.):**

<b>AASC APPROVAL DATE: March 25, 2015</b>
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<b>REVIEW DATE: March 2020</b>
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