El Paso Community College
Syllabus
Part II
Official Course Description

SUBJECT AREA	**Medical Laboratory Technology**
COURSE RUBRIC AND NUMBER	**MLAB 1315**
COURSE TITLE	**Hematology**
COURSE CREDIT HOURS	**3 2 : 4**
	Credits Lec Lab

I. Catalog Description

Studies blood cells in normal and abnormal conditions. Provides instruction in the theory and practical application of hematology procedures, including quality control, quality assurance, lab safety, manual and/or automated methods as well as blood cells maturation sequences, and normal and abnormal morphology with associated diseases. A grade of "C" or better is required in this course to take the next course. **Corequisite: MLAB 1260. (2:4). Lab fee**.

II. Course Objectives

A. Unit I. Laboratory Operations

Upon satisfactory completion of this unit, the student will be able to:

1. Adhere to HIPAA protocols when communicating via telephone, facsimile, or e-mail, or performing Delta Checks.
2. Demonstrate adherence to Standard Precautions and the organization's SOP (Standard Operating Procedures) at all times.
3. Comply with government, state, and organizational safety regulations regarding biological, chemical, radioactive, fire, physical, and electrical hazards.
4. Explain the word "STAT" in relation to turnout time for sample collection, test performance, and test reporting.
5. List the types of body fluids studied in the hematology department and identify their source.
6. Explain the importance of actively participating in Quality Assurance, Quality Control and Proficiency Testing protocols incorporating precision, accuracy, Levey Jennings Charts, and Westgard Rules.
7. Locate and make use of MSDS (Material Safety Data Sheets).
8. Perform basic venous and dermal blood collection procedures.
9. Discuss nosocomial infections and identify the basic programs for infection control.
10. Identify the potential routes of infection and methods for preventing transmission of microorganisms through these routes.
11. Explain the proper techniques for hand washing, gowning, gloving, and masking.
12. Compare and contrast the different blood collection biohazard containers used to dispose of contaminated materials.

B. Unit II. Hematology Studies

Upon satisfactory completion of this unit, the student will be able to:

1. Define phlebotomy and identify the importance of phlebotomy procedures to the overall care of the patient.
2. Define hematology, CBC, indicies, differential, scattergram, histogram, and flow cytometry.
3. Explain the use of laboratory requisitions.
4. Identify the blood collection evacuation tubes required for the hematology department to include the type of additive, amount to be drawn, the reasons such an additive is used, and the importance of the order of draw.
5. Correlate the significance of quality lab results based on quality collection, transportation, processing, and storing of patient samples.
6. Practice proper use of a microscope, including the cleaning, illumination calibration, adjusting, and carrying of a microscope.
7. List the parts of a microscope and explain their function.
8. Describe the four components of blood and explain the clinical significance of studying the RBC's, WBC's, and platelets using manual techniques, automated cell counters, and/or flow cytometry procedures in a hematology department.
9. Observe stained hematology slides and differentiate among red blood cells, white blood cells, and platelets.
10. Explain the use of Wright Stain used to stain the cellular components of blood and bone marrow using Methylene Blue and Eosin.

C. Unit III. Erythrocytes and Their Role in Hematology

Upon satisfactory completion of this unit, the student will be able to:

1. Identify the function of red blood cells in the circulatory system.
2. Describe the hematopoietic system.
3. Identify 70% of commonly ordered laboratory tests in the area of hematology to include sickle cell anemia, ESR's, and microhematocrit.
4. Define and explain the importance of Quality Assurance in the clinical hematology department.
5. Describe general usage of laboratory data, validity of data, sources of error, reference ranges, critical values, and ordering terminology.
6. Associate the RBC morphology to specific disease states and the clinical significance of these laboratory results.
7. Explain what a CBC is and describe the clinical significance of each of these parameters.
8. Explain what the clinical significance of a hemoglobin and hematocrit laboratory test is.
9. Describe the basic concepts of erythrocyte cell differentiation and maturation.
10. Compare and contrast the categories of hematopoietic precursor cells: hematopoietic stem cells, hematopoietic progenitor cells, and maturing cells, including proliferation and differentiation potential, morphology, and population size.
11. Explain the role erythrocyte sedimentation rate (ESR) has played in the laboratory testing arena and its diagnostic and clinical significance today.
12. Discuss possible POC instruments that can be used for hematology studies.

D. Unit IV. Red Blood Cell Anemias

Upon satisfactory completion of this unit, the student will be able to:

1. Describe the clinical significance of different types of anemia.

2. Identify and describe specific anisocytosis and poikilocytosis.
3. Classify and describe red blood cells based on the indicies.
4. Identify and describe red blood cell inclusions, including staining characteristics.
5. Identify laboratory tests to evaluate erythrocyte destruction.
6. Correlate polychromatophilia on a blood smear with other laboratory results of erythrocyte production and destruction.
7. Explain the role reticulocytes play in anemia and explain the clinical significance if these are low or high.
8. Interpret RDW results.
9. Correlate patient history and clinical symptoms with laboratory results in anemia.
10. Diagram the transport of iron from ingestion to incorporation into heme.
11. List the three stages of iron deficiency and define characteristic RBC morphology of each stage.
12. Recognize the clinical features associated with iron deficiency.
13. Define hemoglobinopathy, thalassemia, and hypoproliferative anemia.
14. Explain the basis of defects resulting in the production of abnormal hemoglobins.
15. Describe the epidemiology of sickle cell anemia (SCA) and other hemoglobinopathies.
16. Differentiate thalassemias from hemoglobinopathies based on definition and basic pathophysiology.
17. Describe the typical peripheral blood morphology associated with thalassemia.
18. Compare and contrast the etiology of α- and β-thalassemia.
19. Explain the cause and process of megaloblastic maturation in the bone marrow.
20. Describe the body's requirements for vitamin B12 and folate and their physiologic role.
21. Name four causes of a vitamin B12 deficiency and give two distinguishing clinical or laboratory characteristics of each.
22. List the diagnostic criteria for aplastic anemia.
23. List the major clinical and laboratory characteristics of aplastic anemia.
24. Identify peripheral blood findings associated with the following: aplastic anemia, pure red cell aplasia, and anemia due to renal disease.
25. Identify environmental factors associated with the development of aplastic anemia.
26. List the laboratory test that can be used to assess a hemolytic anemia and give the expected results.
27. Define hemolysis and reconcile a normal hemoglobin in compensated hemolytic disease.
28. Summarize the clinical findings associated with a hemolytic anemia.
29. Summarize iron deficiency anemias, hemoglobinopathies, thalassemias, macrocytic anemias, hypoproliferative anemias, hemolytic anemias, and sickle cell anemias.
30. Describe the clinical significance of finding parasites in RBC's.

E. Unit V. Leukocytes and Their Role in Hematology

Upon satisfactory completion of this unit, the student will be able to:

1. Identify the function of white blood cells in the circulatory system.
2. Describe the hematopoietic system and explain the WBC maturation sequence.
3. Identify terms associated with the increase and decrease in leukocytes.
4. Differentiate morphologically the leukocyte precursors found in the proliferative compartment of the bone marrow.
5. Compare and contrast the development, including distinguishing maturation and cell features, of the granulocytic, monocytic-macrophage, and lymphocytic cell lineages.
6. Compare and contrast the morphology and distinguishing cell features of each of the leukocytes found in the peripheral blood.
7. Compare and contrast the function of each of the leukocytes found in the peripheral blood.
8. List the adult reference ranges for the leukocytes found in the peripheral blood.

9. Differentiate absolute values and relative values of cell count data.
10. Describe a differential count.
11. Explain the difference between a differential count and an absolute count.
12. Calculate a differential and an absolute white blood cell count.

F. Unit VI. Leukocytes and Their Disorders

Upon satisfactory completion of this unit, the student will be able to:

1. Describe acute and chronic leukemia.
2. Describe the typical peripheral blood picture (erythrocytes, leukocytes, and thrombocytes) seen in AML.
3. Contrast acute myeloid leukemia (AML) and acute lymphoblastic leukemia (ALL).
4. Explain the use of cytochemical stains, immunophenotyping, and cell morphology in AML.
5. Define chronic lymphocytic leukemia.
6. Discuss chronic lymphocytic leukemia with respect to the following: occurrence in children and adults, frequency in men/women, onset, clinical picture, white blood cell count, smudge cells, nucleoli in lymphocytes, red blood cell count, Hgb, platelet count, and life expectancy.
7. Discuss acute granulocytic leukemia with respect to the following: the predominant cell type, the nucleus, the cytoplasm, Auer rods, the occurrence in children, and the occurrence in adults.
8. Define hemolytic disease of the newborn.
9. Discuss the following aspects of hemolytic disease of the newborn: source of antibodies, source of antigens, most common cause, result of increased bilirubin in newborns, treatment of choice, laboratory findings.rms, CPT and ICD codes, and patient ABN notification.

G. Laboratory Procedures and Applications

1. The student will be able to perform various types of hematology tests: manual counts, to include red blood cells counts, white blood cell counts, platelet counts, reticulocyte counts, and white blood cell differential counts.

2. The Student Learning Objectives will enable the student to apply all the material in the course to daily laboratory life and testing.

III. THECB Learning Outcomes (WECM)

1. Apply principles of safety, quality assurance and quality control in Hematology.
2. Evaluate specimen acceptability.
3. Compare and contrast hematology values under normal and abnormal conditions.
4. Perform and explain principles and procedures of tests to include sources of error and clinical significance of results.
5. Evaluate normal and abnormal cell morphology with associated diseases.

IV. Evaluation

A. Preassessment

Students should have successfully completed the Specialized Admissions process to enter the Medical Laboratory Technology Program. Prerequisites and/or corequisites may be required for MLAB courses.

B. Postassessment

1. Quizzes, lecture exams, and a final comprehensive written examination will be used to assess students' competency in didactic objectives.

2. Lab competency exams and lab practical exams will be used to assess students' achievement of psychomotor objectives.

3. Lab practical exams require students to demonstrate a particular skill learned in the lab component of the class.

4. Written unit exams will consist of the following question types: multiple-choice, completion, essay, matching, spelling, analysis, and definition or any combination of these.

C. Final Examination

A comprehensive Final Exam is scheduled for this course.

D. Evaluation

To evaluate student's achievement of course objectives, student grades are tabulated using a final grade break down sheet. To successfully complete MLAB1315 Hematology, the student must achieve at least a 70% in course components. The student's overall grade must be no less than a "C" to be allowed to progress to the next program level.

F. Remediation

If a student scores less than 70% on any exam, the instructor will encourage the student to conference with the instructor or a tutor to review problem areas. Different learning and studying techniques will be discussed.

G. Grading

Grading Scale used in calculating student's final grade for MLAB 1315, Hematology:

Evaluation Tools	% Value	Grading Scale
Quizzes	10%	A = 90 -100%
Lecture Exam I	20%	B = 80 - 89%
Lecture Exam II	20%	C = 70 - 79%
Lecture Exam III	20%	D = 60 - 69%
Comprehensive Final	30%	F = 59% and below

(Hematology Lab is on a Pass/Fail basis. Laboratories will be graded on a Pass/Fail system based on the competency limits set by the program for each individual procedure. An average of 80% is required to pass the laboratory portion of MLAB 1315, Hematology.)

Each grade will initially be determined in decimals to the tenths. The final grade however, will only be recorded as a whole number. The guide used will be to round 0.1 through 0.4 to the lower whole number and to round 0.5 through 0.9 to next whole number. Example: If at the end of the course a student earns 87.4, the grade will be reflected as 87%. If the student earns 87.6, the grade will be rounded to 88%. No decimals will be shown on the final grade scanners.

V. Disability Statement (Americans with/Disabilities Act [ADA])

EPCC offers a variety of services to persons with documented sensory, mental, physical, or temporary disabling conditions to promote success in classes. If you have a disability and believe you may need services, you are encouraged to contact the Center for Students with Disabilities to discuss your needs with a counselor. All discussions and documentation are kept confidential. Offices located: VV Rm C-112 (831-2426); TM Rm 1400 (831-5808); RG Rm B-201 (831-4198); NWC Rm M-54 (831-8815); and MDP Rm A-125 (831-7024).

VI. 6 Drop Rule

Students who began attending Texas public institutions of higher education for the first time during the Fall 2007 semester or later are subject to a 6-Drop limit for all undergraduate classes. Developmental, ESL, Dual Credit and Early College High School classes are exempt from this rule. All students should consult with their instructor before dropping a class. Academic assistance is available. Students are encouraged to see Counseling Services if dropping because exemptions may apply. Refer to the EPCC catalog and website for additional information.