

**Course Description****MLS4306 | Clinical Hematology | 3.00 credits**

This course is the study of the composition and function of blood; diseases related to blood disorders. Students will receive the necessary skills in the application of hematology diagnostic procedures, interpretation, problem solving and correlation of laboratory findings with disease states.

**Course Competencies:**

**Competency 1:** Students will demonstrate an understanding of the principles involved in Safety and procedures used in the laboratory procedures by:

1. Explain laboratory safety as described in the OSHA of 1970, 29 USCA sections 655, and all subsequent regulations, including instructions in universal precautions
2. Choose potential laboratory safety hazard situations and take appropriate actions to minimize injury to self and others
3. Evaluate a specimen as acceptable for hematology testing or coagulation studies
4. Evaluate quality control as needed, and the corrective actions to ensure the accuracy of all reported hematology test results
5. Explain instrument maintenance and calibrations as required to ensure optimal instrument performance during use
6. Illustrate quality control data, equipment maintenance, corrective actions when troubleshooting defective equipment, and test results

**Competency 2:** The student will demonstrate an understanding of the origin of blood and blood products and its applications by:

1. Evaluate the ontogeny and theories of hematopoiesis regarding what, when, why, where, and how it happens
2. Identify and describe classic morphologic characteristics of the erythrocyte, neutrophil, monocyte, lymphocyte, and thrombocyte at each maturation stage
3. Distinguish an immature from a mature blood cell
4. Apply hematology terminology to describe and interpret peripheral blood and bone marrow aspirate smears stained with Romanowsky stain
5. Explain the mechanisms of coagulation and fibrinolysis by:
  6. defining what the intrinsic, extrinsic, standard, and alternate pathways are stating how they interact
  7. Identify the plasma proteins and blood cells involved by name and activity
  8. Given a Wright-stained peripheral blood or bone marrow smear, and related smear findings to common hematological and hemostatic disorders

**Competency 3:** The student will demonstrate an understanding of Hematological applications by:

1. Selecting and explaining the use of materials and reagents necessary to perform cell counts; quantitate and separate hemoglobin; determine packed cell volumes and erythrocyte sedimentation rates; calculate red cell and other cell indices; stain blood and bone marrow smears to identify and characterize erythrocytes, leukocytes, and platelets; test for hemolytic anemia; and conduct quality control testing
2. Explaining the analytical principles (both manual and automated) and diagnostic utility for tests used in the evaluation of the disorders of red cells, white cells, platelets, and hemostasis to include blood cell counts, reticulocyte counts, erythrocyte sedimentation rates, hematocrits, differentials, hemoglobinopathy, hemoglobin solubility, hemoglobin electrophoresis, osmotic fragility
1. Explaining the principles and diagnostic utility of the following cytochemical and immunochemical procedures: nitro blue tetrazolium [NBT], acid phosphatase, tartrate-resistant acid phosphatase [TRAP], leukocyte alkaline phosphatase [LAP], esterases, myeloperoxidase [MPO], periodic acid-Schiff [PAS], Sudan black B [SBB], Prussian blue, terminal deoxynucleotidyl transferase [TdT], CD markers
2. Demonstrating skills and application of automated and manual methods to count and differentiate white cells, red cells, and platelets; estimate erythrocyte sedimentation rates; quantitate packed cell volumes; prepare and stain peripheral blood, buffy coat and bone marrow aspirate smears; quantitate and separate

hemoglobin; test for hemolytic anemias; and identify health or disease states

**Competency 4:** The student will demonstrate an understanding of instrumentation applications of hematology by:

1. Select a procedural course of action appropriate for the type of blood sample received and the hematology test(s) to be performed
2. Correlate laboratory and clinical data to recommend additional laboratory tests
3. Correlate laboratory and clinical data to identify common hematological conditions and diseases, including those related to bleeding disorders
4. Evaluating laboratory data to recognize common procedural/technical problems; verify test results; check for and identify possible sources of pre-analytical and analytical error; determine possible inconsistent results; recognize health and disease states; differentiate specific hematologic disease states, including anemias, thalassemias hemoglobinopathies, myelodysplastic syndromes, lymphoproliferative and myeloproliferative disorders, immunoproliferative disorders, malignant lymphomas; and to assess the accuracy of procedures for a given hematology test

**Competency 5:** The student will demonstrate Interpersonal and Communication Skills by:

1. Demonstrating professional communication skills throughout their interactions with coworkers. Students will be expected to act as constructive and proactive members of the practice
2. Applying medical knowledge to patients by demonstrating investigatory and analytical thinking to clinical situations
3. Explaining morphology, physiology, and biochemistry of blood, marrow, and lymphatic tissue; basic molecular and pathophysiologic mechanisms, diagnosis, and therapy of diseases of the blood; cytochemical studies; effects of systemic disorders, infections, solid tumors;
4. Integrating knowledge and making informed judgments about hematological test results in the clinical setting
5. Formulating a straightforward, answerable question, predict expected results, and follow written protocols and verbal instructions
6. Collecting and organizing data in a systematic fashion
7. Present data appropriately, assess data validity (including integrity and significance) and draw appropriate conclusions based on the results

**Learning Outcomes:**

- Communicate effectively using listening, speaking, reading, and writing skills
- Solve problems using critical and creative thinking and scientific reasoning
- Demonstrate knowledge of ethical thinking and its application to issues in society