



**Umm Al-Qura University**  
**Faculty of Applied Medical**  
**Sciences**

**Laboratory Medicine Department**



كلية العلوم  
الطبية التطبيقية  
Faculty of Applied  
Medical Sciences

**Course overview – Diagnostic Hematology**

Course code and number	1701352-5
Course title	Diagnostic Hematology
Level/semester	3 <sup>rd</sup> year / 1 <sup>st</sup> and 2 <sup>nd</sup> semester
Credit hours	5 CU (3 hours)
	Theoretical lectures / Practical
Name of faculty member responsible for the course	<b>Dr. Amal Ezzat</b> : Associate Professor in hematopathology <b>Dr. Ahmad Arbaeen</b> : Assistant Professor in haematology. <b>Dr. Hibah Almassmoum</b> : Assistant Professor in haematology. <b>Dr. Sameh Baz</b> : Assistant Professor in haematology. <b>Ms. Shefaa Hejazi</b> : Hematology Lecturer
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**Course description:** The study of blood cells & its cellular components in normal and abnormal conditions.

**Objectives:**

1. Describe the anatomy and physiology of normal hemopoiesis.
2. Describe the structure of hemoglobin and processes involved in iron metabolism.
3. Classify the different types of anemia.
4. Describe the abnormalities that occur in hemoglobinopathies.
5. Discuss the metabolism of vitamin B12 and folate and their role in hemopoiesis.
6. Describe the red cell enzyme pathways and the red cell membrane defects.
7. Identify and discuss the various forms of hemolysis and their causes.
8. Discuss the importance and role of quality control/management in a routine Hematology laboratory.
9. Discuss the diagnosis and classification of acute and chronic leukemias.
10. Describe and discuss the diagnosis of myeloproliferative and lymphoproliferative disorders.
11. Discuss the nature of events contributing to normal and abnormal hemostasis including acquired and inherited defects.
12. Discuss antithrombotic therapy currently available in clinical practice.
13. Examine, report and interpret the morphological features seen in the peripheral blood in the microscopic examination of blood disorders.

15. Recommend and undertake a range of laboratory tests, and interpret their results to assist in the diagnosis of hematological disorders.

### Learning Outcomes:

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.

### Overview of Assessment

This course will be assessed via theory/practical examinations, study question, oral presentation, and practical assessments. Note that students must achieve a passing result in both the theory and practical components of this course to gain an overall pass.

	(%)	Marks	Department Suggestions
<b>Theoretical assessment</b>			
<b>Med-term exam</b>	25%	12.5	20-25%
<b>Final Exam</b>	50%	25	50%
<b>Activity session (study Questions)</b>	5%	2.5	5-10%
<b>Practical assessment</b>			
<b>Final exam</b>	10%	5	20-25%
<b>Continuous evaluation</b>	2%	1	
<b>Case study report</b>	3%	1.5	
<b>Case study sessions (week 13)</b>	5%	2.5	
<b>Total</b>	100%	50	

Week	Topics	Laboratory	
1	<b>Introduction to Hematology</b> Blood cell types and function	-----	
2	<b>Blood Cell Development and Examination</b> • Hematopoiesis	<ul style="list-style-type: none"> <li>• Introduction</li> <li>• Hazards and Safety in Hematology Lab.</li> <li>• Sample Collection and Handling guidelines for hematologic testing. Orientation of hematology lab</li> <li>• The Procedure of viewing a blood film using the light microscope</li> </ul>	
3	<b>Erythrocytes I</b> • Normal red blood cell production & destruction • Membrane physiology and structure	<ul style="list-style-type: none"> <li>• preparation of peripheral blood smear and quality assessment</li> <li>• Staining of peripheral blood smear</li> <li>• -- Assessment of stain quality and cell distribution</li> </ul>	
4	<b>Erythrocytes II</b> • Hemoglobin structure and iron metabolism <b>Introduction to erythrocyte disorders</b> • General principles • Classification	<ul style="list-style-type: none"> <li>• Hemoglobin Estimation using spectrophotometer</li> <li>• RBCs Count using the Advanced Neubauer Chamber</li> </ul>	
5	<b>Nutritional anemia</b> • Iron deficiency anemia • <b>Megaloblastic Anemia</b> • Other causes of nutritional anemia	<ul style="list-style-type: none"> <li>• RBCs indices and PCV</li> <li>• Examination of a peripheral blood smear for red cells morphology</li> <li>• Blood films of IDA and megaloblastic anemia</li> </ul>	
6	<b>Other types of anemia</b> • Anemia of chronic disease. • Aplastic anemia. • Anemias associated with bone marrow disease	<ul style="list-style-type: none"> <li>• Case studies : (Hospital report+ blood slides) for different cases of anemia(Iron Deficiency Anemia ,Megaloblastic Anemia and aplastic anemia</li> </ul>	
7	<b>Introduction to increased destruction of erythrocytes (hemolytic anemia)</b> - Intrinsic defects - Extrinsic defects <b>Hemoparasites</b> • Malaria - Incidence - Pathogenesis - Clinical and laboratory findings	<ul style="list-style-type: none"> <li>• Reticulocyte Count</li> <li>• demonstrate Heinz bodies</li> <li>• A case study and blood smear for G6PD Deficiency</li> </ul>	

Week	Topics	Laboratory	
8	<b>Red cell enzyme deficiencies</b> <b>Red cell membrane disorders</b> hereditary spherocytosis	<ul style="list-style-type: none"> <li>• A Case study of Hereditary Spherocytosis</li> <li>• Erythrocyte Sedimentation Rate (ESR)</li> <li>• Osmotic fragility</li> </ul>	
9	<b>Thalassemia</b> <b>Hemochromatosis</b>	<ul style="list-style-type: none"> <li>• Procedure of Hb electrophoresis</li> <li>• Case studies of: Thalassemia major Thalassemia minor Hb H disease (alpha thalassemia)</li> <li>• Peripheral blood smear for thalassemia</li> </ul>	•
10	<b>Sickle cell anemia</b> <b>Hemoglobinopathies</b>	<ul style="list-style-type: none"> <li>• Detection of Hgb S in the laboratory: -Solubility Test -Sickling Test</li> <li>• Peripheral blood smear for SCD</li> <li>• Case studies of: -Sickle Cell Disease and SC Trait</li> </ul>	
11	<b>Immune hemolytic anemia</b>	<ul style="list-style-type: none"> <li>• Revision of the different methods of diagnosis of the different types of anemia</li> <li>• <b>studying different RBCs shape abnormalities</b></li> </ul>	
12	Approach anemia to diagnosis	<ul style="list-style-type: none"> <li>• Leucocytes' Morphology in smears of peripheral blood and bone marrow</li> <li>• The Manual Total Leucocyte Count using the advanced Neubauer chamber</li> </ul>	
13	<b>Leucocytes</b> <ul style="list-style-type: none"> <li>• Leucocyte development, structure, function</li> <li>• Differential count</li> <li>• Tests for white blood cells</li> </ul>	Perform the Differential Leucocyte Count for normal smear	
14	<b>Introduction to Leucocyte Disorders</b> <ul style="list-style-type: none"> <li>• General principals</li> <li>• Non-malignant leucocyte disorders</li> <li>• Diagnostic tests</li> </ul>	<b>Revisions</b>	