



يونيفرسيتي سلطان زين العابدين
UNISZA
UNIVERSITI SULTAN ZAINAL ABIDIN

FACULTY OF MEDICINE

STUDENT GUIDE

SEMESTER 1 YEAR 1

Course Code: BMM10306

Academic Session 2021/2022

COURSE 3: Haematology and Immunology

DATE OF COURSE: 29 May, 2022 – 7 Jul, 2022

Prepared by:

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MBBS Curriculum Committee Member
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FACULTY OF MEDICINE

VISION

Faculty of Medicine aspires to be an excellent institution in producing high quality health professionals, research and community services.

MISSION

Faculty of Medicine shall provide dynamic curricula guided by excellent educators in conducive environment, nurture sustainable research culture and inculcate community-focused activities.

LOCATION

MKK 1	: Makmal Kemahiran Klinikal 1
MKK 2	: Makmal Kemahiran Klinikal 2
DT	: Dewan Theater
DKA	: Dewan Kuliah A
DKB	: Dewan Kuliah B
CL1	: Makmal Mocomputer 1
CL3	: Makmal Mocomputer 3
MBiokim	: Makmal Biokimia
MMikro	: Makmal Mikrobiologi
MHisto	: Makmal Histologi
BT1	: Bilik Tutorial 1
BT2	: Bilik Tutorial 2
BT3	: Bilik Tutorial 3
BT4	: Bilik Tutorial 4
BT5	: Bilik Tutorial 5
BT6	: Bilik Tutorial 6

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TEACHING AND LEARNING METHODS

L : Lecture
F (SGD): Forum (Small Group Discussion)
P : Practical
ECE : Early Clinical Exposure
PPD : Personal and Professional Development
PBL : Problem Based Learning
KELIP : e-learning

COURSE 3: HAEMATOLOGY AND IMMUNOLOGY

Course 3 Coordinator: AP Dr. Uday Younis Hussein

H/P: 0103986315

CONTENT SYNOPSIS

This course emphasises the fundamental knowledge of normal blood cells production, mechanisms of haematological diseases, blood transfusion practice, stem cell and organ transplantation. It covers the principles of the body's defence mechanisms, the role of the immune system in health and disease and the basic concepts of common haematological disorders as well as the pharmacological treatment will be explained. The student shall be able to correlate the knowledge to clinical disturbances and diseases related to the haematological and immune systems.

COURSE LEARNING OUTCOMES (CLO VS PLO/ MQF):

At the end of this module the students should be able to:

CLO1: Demonstrate how the structures, functions, mechanism of disease and drug action are inter-related in haematology and immunology. (C3)	MQF1: Knowledge and Understanding		75
Final Exam	MCQ	Final Assessment	30
Final Exam	Structured Essay	Final Assessment	20
Quiz	MCQ	Continuous Assessment	25
CLO2: Perform basic medical examination and procedures to identify normal structure, function and diseases in haematology and immunology. (P4)	MQF3a: Practical Skills		15
Final Exam	OSPE	Final Assessment	10
Practical assessment	Supervisor report	Continuous Assessment	5
CLO3: Demonstrate effective communication with peers during collaborative learning (A3)	MQF3c: Communication Skills		5
Group work assessment	Supervisor report	Continuous Assessment	5
CLO4: Demonstrate good teamwork with peers during collaborative learning (A3)	MQF3f: Leadership, autonomy and responsibility		5
Group work assessment	Supervisor report	Continuous Assessment	5

ASSESSMENT:

CLO	Description	PLO	Tax	MQF	Weight (100%)	Delivery
CLO1	Demonstrate how the structures, functions, mechanism of disease and drug action are inter-related in haematology and immunology.	PLO1(C3)	C3	MQF1 - Knowledge and Understanding	75	interactive lecture, SGD
CLO2	Perform basic medical examination and procedures to identify normal structure, function and diseases in haematology and immunology.	PLO3(P4)	P4	MQF3a - Practical Skills	15	Practical
CLO3	Demonstrate effective communication with peers during collaborative learning	PLO5(A3)	A3	MQF3c - Communication Skills	5	PBL, SGD, ECE
CLO4	Demonstrate good teamwork with peers during collaborative learning	PLO8(A3)	A3	MQF3f - Leadership, autonomy and responsibility	5	PBL, SGD, ECE

CLO	Weight (%)	Expected SLT (H)	Total SLT (H)	Topic SLT(H)				
				IL	L (F2F)	T (F2F)	P (F2F)	O (F2F)
CLO1	75	180	183.4	114.4	21	3	0	7.2
CLO2	15	36	37.3	19	0	0	13	4
CLO3	5	12	10.7	6.8	0	1	0.5	2.4
CLO4	5	12	10.7	6.8	0	1	0.5	2.4
TOTAL	100	240	242.1 Credit Hours: 6.05	147	21	5	14	16
<ul style="list-style-type: none"> • Total GL = 84 • SLT TOPIC, 230 (95.00%) AND ASSESSMENT, 12.1 (5.00%) • Contact Hour (6 weeks) = 14/w 								

Course Content (lectures)

Lec No.	Discipline	Lecturer	Title	Learning Outcome
ANATOMY				
1	Anatomy 1	NFMN	Lymphoreticular system	<ol style="list-style-type: none"> 1. Describe the components of lymphatic system 2. Explain the lymphatic drainage of the human body and its termination (General). 3. Describe the gross and microscopic anatomy of lymph node and palatine tonsil. 4. Describe the mucosa associated lymphoid tissue (MALT). 5. Explain the related clinical application. 6. Describe the gross and microscopic anatomy of thymus and spleen. 7. Explain the clinical conditions related to spleen and thymus
MICROBIOLOGY				
1	Microbiology 1	SIS	Acquired Immunodeficiency syndrome (AIDS)	<ol style="list-style-type: none"> 1. Describe the HIV structure, transmission, latency and target cells. 2. List the stages of HIV infection. 3. Explain the haematological changes in HIV infection. 4. State the common opportunistic infections and AIDS defining illness. 5. Discuss the pathogenesis, risk factors, clinical manifestation, laboratory investigation of HIV infection 6. Outline the management and prevention of HIV.
IMMUNOLOGY				
1	Immunology 1	RAR	Innate immunity	<ol style="list-style-type: none"> 1. Differentiate innate and adaptive immune responses 2. Illustrate the mechanism of innate immune cells in host defence and inflammatory reactions 3. Relate activation of complement systems (MBL and alternative pathway) with biologic effects and clinical aspects 4. Describe general properties of cytokines and their roles in disease
2	Immunology 2	RAR	Antigen and Antibody	<ol style="list-style-type: none"> 1. Distinguish between antigens and “molecular patterns” 2. Describe basic structural, variants and function of antibody 3. Outline the process of antibody production and formation of immunoglobulin classes 4. Describe structural and biologic properties of different immunoglobulin classes 5. Describe clinical application of antibodies and immunogenicity of protein antigens

Lec No.	Discipline	Lecturer	Title	Learning Outcome
3	Immunology 3	RAR	Human leukocyte antigen (HLA)	<ol style="list-style-type: none"> 1. Describe the structural and classification of HLA molecules 2. Describe the role of HLA in immune response and antigen presentation 3. Relate clinical role of HLA in diseases 4. Outline the HLA typing
4	Pathology 2	RAR	Lymphopoiesis	<ol style="list-style-type: none"> 1. Describe the development (maturation) of B lymphocytes. 2. Describe the positive selection of B cell. 3. State the role of antigen presenting cell. 4. Describe the plasma cells development. <p>Describe the positive and negative selection of T cells in the thymus.</p>
5	Immunology 4	RAR	Adaptive Immunity - Humoral Mediated Immunity	<ol style="list-style-type: none"> 1. Describe features of humoral mediated immunity 2. Differentiate between primary vs secondary humoral immune response 3. Outline the process antigen recognition by antibody 4. Explain the effector functions of antibody in host defence 5. Explain antibodies deficiencies in clinical diseases
6	Immunology 5	RAR	Adaptive Immunity – Cell Mediated Immunity	<ol style="list-style-type: none"> 1. Describe the features of cell mediated immunity 2. Describe process of antigen processing and presentation by different class of MHC 3. Explain downstream effect of T cells activation in cellular mediated immune responses 4. Explain effect of defective T-cells in immune response
7	Immunology 6	MA	Organ Transplantation and Rejection	<ol style="list-style-type: none"> 1. Describe various gradation relationship between donor and recipient in organ transplantation 2. Describe differences in three categories of allograft rejection 3. Outline the immune mechanisms that responsible for allograft rejection 4. Outline the preventive strategies of graft rejection.
8	Immunology 7	MA	Hypersensitivity	<ol style="list-style-type: none"> 1. Define the term hypersensitivity. 2. Compare and contrast the properties of four types of hypersensitivity reaction (immunologic aspect and clinical manifestation) 3. Explain the mechanism of each type of hypersensitivity reactions 4. Explain the clinical aspects of diseases associated with each type of hypersensitivity reactions

Lec No.	Discipline	Lecturer	Title	Learning Outcome
9	Immunology 8	MA	Autoimmunity	<ol style="list-style-type: none"> 1. Define autoimmunity and autoimmune disease. 2. Discuss the genetic and environmental roles in autoimmunity. 3. Explain mechanism of T cells and antibodies mediated organ damage 4. Discuss the therapeutic strategies for autoimmune diseases
10	Immunology 9	MA	Principles of immunity to infection	<ol style="list-style-type: none"> 1. Describe the host-pathogen relationship. 2. Explain the principle of immunity to various classes of microbial pathogens 3. Discuss the mechanisms by which pathogens evade host immune response. 4. Inflammatory markers: definition, types clinical applications.
11	Immunology 10	MA	Congenital (Primary) Immunodeficiency	<ol style="list-style-type: none"> 1. Distinguish between primary and secondary (acquired) immunodeficiency 2. Relate defective of immune responses in development of common congenital immunodeficiencies 3. Outline clinical features and diagnostic findings of congenital immunodeficiency diseases 4. Discuss management and treatment of T-cell and combined immunodeficiency
12	Immunology 11	RAR	Tumour Immunology	<ol style="list-style-type: none"> 1. Describe the different types of tumour antigen and immunologic factors influencing the incidence of cancer 2. Describe effector mechanisms in tumour immunity 3. Outline mechanism of tumour evasion from immune response 4. Discuss immunodiagnosis (tumour markers), immunoprophylaxis and immunotherapy of tumour
13	Immunology 12	RAR	Immunization	<ol style="list-style-type: none"> 1. Describe principle and objectives of immunization 2. Compare and contrast active and passive immunization 3. Outline the types of vaccines and precaution measures 4. Apply the principle of immunization in emerging diseases
HAEMATOLOGY				
14	Pathology 1	UYH	Blood Physiology and thrombopoiesis	<ol style="list-style-type: none"> 1. Define blood, plasma and hematopoiesis. 2. State the blood composition, characteristics, functions and volume. 3. Describe haemopoietic microenvironment. 4. Describe the differentiation of hematopoietic cells and regulation of haemopoiesis. 5. Describe the platelets formation (thrombopoiesis).

Lec No.	Discipline	Lecturer	Title	Learning Outcome
15	Pathology 3	UYH	Erythropoiesis and Granulopoiesis	<ol style="list-style-type: none"> 1. Identify the granulocytic series, life span and functions of granulocytes. 2. Illustrate the regulation of neutrophil count. 3. Describe the characteristics of granulocytic series and neutrophils granules contents. 4. Identify and describe the neutrophils recruitment and the interactions with endothelial cells. 5. Describe the neutrophil mechanisms for protection against infection. 6. Differentiate erythropoiesis, ineffective erythropoiesis and dys-erythropoiesis. 7. Describe the erythroid series, regulation and control of erythropoiesis. 8. Illustrate the blood cells development from fertilised ovum to maturity. 9. Explain the oxygen sensor mechanism of erythropoiesis. 10. Describe the erythropoietin and its expression.
16	Pathology 4	UYH	Non-Neoplastic Disorders of white blood cells	<ol style="list-style-type: none"> 1. Describe the quantitative and qualitative changes of each type of white blood cells. 2. Describe the morphological abnormalities of neutrophil nucleus and cytoplasm. 3. Differentiate leukaemoid reaction from left shift. 4. Describe the non-neoplastic morphological abnormalities of lymphocytes. 5. Apply the quantitative changes with the clinical application.
17	Pathology 6	UYH	Structure and function of red blood cell and haemoglobin	<ol style="list-style-type: none"> 1. Describe the red blood cell (RBC) membrane structure and its characteristics 2. Describe haemoglobin (Hb) structure, functions, types, switching and catabolism. 3. Describe the mechanism of oxygen loading and unloading by Hb. 4. Illustrate oxygen dissociation curve (ODC), Hb affinity (P50) and factors affecting ODC 5. Describe the myoglobin, glycosylated and met-Hb.
18	Pathology 7	UYH	Iron, VitamineB₁₂ and Folate	<ol style="list-style-type: none"> 1. Describe the heme and globin synthesis. 2. Define porphyria and its types. 3. Describe iron absorption, utilization, distribution, transport, storage and excretion forms of iron. 4. Describe the vitamin B₁₂ and folic acid sources, absorption and causes of deficiency. 5. Differentiate the characteristics of folate compared with vitamin B₁₂.

Lec No.	Discipline	Lecturer	Title	Learning Outcome
19	Pathology 8	UYH	Hypochromic Anaemias and Iron Overload	<ol style="list-style-type: none"> 1. Define and classify anaemia. 2. State the causes of hypochromic microcytic anaemia. 3. Describe the stages of development of iron deficiency anaemia (IDA), factors affecting iron absorption, causes, clinical features, laboratory investigations and treatment of IDA. 4. Describe the features, mechanism and treatment of anaemia of chronic disorders and sideroblastic anaemia. 5. Describe the causes, clinical, haematological features, diagnosis and treatment of iron overload.
20	Pathology 9	UYH	Megaloblastic Anaemia	<ol style="list-style-type: none"> 1. Define megaloblastic anaemia (MA). 2. List the causes of vitamin B₁₂ and folate deficiency. 3. Describe the clinical, blood and bone marrow findings in MA. 4. Describe the mechanism and characteristics of pernicious anaemia. 5. Describe the diagnosis and treatment of MA.
21	Pathology 10	UYH	Haemolytic Anaemias (Membranopathy)	<ol style="list-style-type: none"> 1. Describe the aetiological classification of anaemia. 2. Define and classify haemolytic anemias (HA). 3. Define hereditary spherocytosis (HS). 4. Describe the mechanism, clinical features and laboratory investigations of HS. 5. Outline the Southeast Asian ovalocytosis and hereditary stomatocytosis.
22	Pathology 11	UYH	Enzymopathy and immune haemolytic anaemias	<ol style="list-style-type: none"> 1. Identify the characteristics of glucose-6-phosphate dehydrogenase (G6PD) deficiency. 2. Illustrate the mechanism of G6PD deficiency. 3. Outline the WHO classification of G6PD deficiency. 4. Describe the features and laboratory investigations of G6PD deficiency. 5. Classify the immune hemolytic anaemias (HA) and describe the of autoimmune and alloimmune HA.
23	Pathology 12	UYH	Thalassaemias	<ol style="list-style-type: none"> 1. Define thalassaemia. 2. Describe the clinical types, geographical distribution and the genetic inheritance of α and β-thalassaemia. 3. Describe the mechanism of α and β-thalassaemia. 4. Describe the features and laboratory investigations for α and β-thalassaemia. 5. Correlate the clinical features with the mechanism of disease. 6. Outline the prevention and treatments of α and β-thalassaemia.
24	Pathology 13	UYH	Haemoglobinopathies (Hb-S and Hb-E diseases)	<ol style="list-style-type: none"> 1. Describe the classification and mechanism of sickle cell and Hb-E diseases. 2. Describe the clinical features, blood findings and laboratory investigations in sickle cell and Hb-E diseases. 3. Describe the classification, clinical features and laboratory findings in of Hb-E /B-thalassemia.

Lec No.	Discipline	Lecturer	Title	Learning Outcome
25	Pathology 14	UYH	Aplastic Anaemia	<ol style="list-style-type: none"> 1. Define and classify aplastic anaemia (AA). 2. Describe the mechanism of AA. 3. Describe the clinical features and diagnosis of AA. 4. Describe the characteristics of Fanconi anaemia (FA). 5. Describe the mechanism, clinical features and diagnosis of paroxysmal nocturnal haemoglobinuria (PNH).
26	Pathology 15	AD	ABO and minor blood group systems	<ol style="list-style-type: none"> 1. Describe the characteristics of ABO and rhesus (Rh) antigens. 2. Describe the inheritance and formation of A, B, H and Rh antigens. 3. Outline minor blood group systems e.g. Kell, Kidd and Duffy. 4. Outline the characteristics of ABO and Rh- antibodies. 5. Describe the mechanism of ABO and Rh-incompatibility in pregnancy and blood transfusion.
27	Pathology 16	AD	Principles of Blood Transfusion	<ol style="list-style-type: none"> 1. Describe the principles of blood transfusion and their clinical application. 2. Outline the preservative and anti-coagulant for RBCs storage. 3. Describe the principle and types blood components preparation (manual and apheresis technology). 4. Describe the characteristics and indications of whole blood and each blood components.
28	Pathology 17	AD	Immediate blood transfusion reactions	<ol style="list-style-type: none"> 1. Describe the features of blood transfusion reaction. 2. Classify the transfusion reactions. 3. Describe the mechanisms, prevention, diagnosis and management of immediate haemolytic transfusion reaction. 4. Describe the mechanisms, prevention, diagnosis and management of febrile non-haemolytic transfusion reaction. 5. Describe the mechanisms, prevention, diagnosis and management of transfusion-related acute lung injury.
29	Pathology 18	AD	Delayed and other blood transfusion reactions	<ol style="list-style-type: none"> 1. Describe the mechanisms, and diagnosis of allergic reaction and anaphylaxis transfusion reaction. 2. Describe the causes of immediate (acute) non-immunologic transfusion reaction. 3. Describe the mechanisms, prevention, diagnosis and management of transfusion associated circulatory overload and delayed haemolytic transfusion reaction. 4. Describe the mechanisms, prevention, diagnosis and management of transfusion associated graft-versus-host disease. 5. Explain the post-transfusion purpura and the delayed non-immunologic transfusion reaction.

Lec No.	Discipline	Lecturer	Title	Learning Outcome
30	Pathology 19	UYH	Haemostasis	<ol style="list-style-type: none"> 1. Define and classify haemostasis. 2. Describe the coagulation system and its factors. 3. Describe the cell model of coagulation system activation. 4. Describe the fibrinolytic system and its factors. 5. Briefly explain the characteristics of natural anticoagulants (natural inhibitor).
31	Pathology 20	UYH	Bleeding disorders: vascular and platelets defects	<ol style="list-style-type: none"> 1. Correlate the bleeding manifestations with the type of hemostasis defects. 2. Describe the congenital and acquired causes of vascular purpura. 3. Describe the aetiological and clinical classification of thrombocytopaenia. 4. Describe the types, mechanism, blood and bone marrow findings of immune (idiopathic) thrombocytopenic purpura (ITP). 5. Illustrate the types, mechanism and features of familial thrombotic thrombocytopaenic purpura (TTP).
32	Pathology 21	UYH	Inherited coagulation disorders	<ol style="list-style-type: none"> 1. Define and classify von Willerbrand disease (vWD), haemophilia and thrombophilia. 2. Describe the clinical features, characteristics bleeding, investigations, treatment and genetic counselling of haemophilia. 3. Outline the hereditary deficiency of other coagulation factors. 4. State the causes and features of inherited thrombophilia: <ul style="list-style-type: none"> ○ anti-thrombin (AT-III) ○ protein C, ○ protein S deficiencies ○ activated protein C resistance. 5. Describe causes of acquired thrombophilia.
33	Pathology 22	UYH	Acquired coagulation disorders	<ol style="list-style-type: none"> 1. Describe the causes and mechanism of disseminated intravascular coagulation (DIC). 2. Describe the clinical features and diagnosis of DIC. 3. Describe aetiology, features, diagnosis and treatment of haemorrhagic disease of newborn (HDN). 4. Describe the causes of acquired coagulation disorders in liver disease.
34	Pathology 23	UYH	Acute Leukaemias	<ol style="list-style-type: none"> 1. Define and classify acute leukaemia (AL) types. 2. Describe the causes, mechanism, clinical features, blood and bone marrow findings, and the diagnosis of AL. 3. Differentiate the French-American-British (FAB) and WHO classification of AL. 4. Outline the mixed phenotype acute leukaemia. 5. Correlate the clinical features with the underlying mechanism.

Lec No.	Discipline	Lecturer	Title	Learning Outcome
35	Pathology 24	UYH	Chronic Myeloid Leukaemia	<ol style="list-style-type: none"> 1. Define chronic myeloid leukaemia (CML). 2. Describe the molecular defect and mechanism of CML. 3. Describe the clinical features and blood and bone marrow findings of chronic phase of CML. 4. Correlate the clinical features with the mechanism of disease. 5. Describe the characteristics of accelerated and blastic phases of CML. 6. Illustrate the role of molecular techniques in confirming the diagnosis of CML.
36	Pathology 25	UYH	Myeloproliferative disorders	<ol style="list-style-type: none"> 1. Classify the myeloproliferative disorders (MPD). 2. Define and classify polycythaemia. 3. Describe the aetiology, clinical features, diagnostic criteria and complications of polycythaemia vera (PV). 4. Describe the aetiology, clinical features, diagnostic criteria and complications of essential thrombocythaemia (ET). 5. Describe the aetiology, clinical features, diagnostic criteria and complications of idiopathic myelofibrosis (IM).
37	Pathology 26	UYH	Lymphomas and Chronic lymphocytic leukaemia	<ol style="list-style-type: none"> 1. Define and classify chronic lymphocytic leukaemia (CLL) and lymphoma. 2. Outline the mechanism of CLL and lymphoma. 3. Describe the clinical features, diagnosis, spread and classification of Hodgkin and non-Hodgkin lymphomas (NHL): <ul style="list-style-type: none"> ○ Follicular lymphoma. ○ Diffuse large cell lymphoma. ○ Burkitt's lymphoma. 4. Describe the clinical features, the blood and bone marrow findings of the chronic and other phase of CLL. 5. Describe the staging of CLL and lymphoma.
38	Pathology 27	UYH	Introduction to haematology diagnosis	<ol style="list-style-type: none"> 1. List haematology reference ranges and their use in the diagnosis of blood diseases. 2. Outline automation in hematology. <ul style="list-style-type: none"> ○ Full blood cell count (FBC). ○ Coagulation test. ○ Pretransfusion tests. 3. Explain the approach in leukaemias diagnosis. 4. Explain the approach in anaemias diagnosis.

Lec No.	Discipline	Lecturer	Title	Learning Outcome
39	Pathology 28	UYH	Bone Marrow Aspirate and Biopsy	<ol style="list-style-type: none"> List the sites of haemopoiesis during life. Describe the normal cellular composition of the bone marrow (BM). Outline the principles of bone marrow aspiration (BMA) and bone marrow biopsy (BMB): <ul style="list-style-type: none"> BMA and BMB procedure and needle selection. BMA material processing. BMB imprint preparation. BM cellularity assessment. Investigations of BMA and BMB. Complications of BMA & BMB procedures.
40	Pathology 29	UYH	Molecular and immunological Investigations	<ol style="list-style-type: none"> Describe the principle, procedure, application and advantages and disadvantages of cytogenetic analysis: <ul style="list-style-type: none"> Karyotype (chromosomal banding). FISH (Fluorescence in situ hybridization). Define and describe the principle of immunophenotyping by flow cytometry. State the cluster of differentiation (CD) marker used in acute leukaemia.
41	Pathology 30	UYH	Stem cell transplantation	<ol style="list-style-type: none"> Describe the types, properties, sources and collection of SC (SC): <ul style="list-style-type: none"> Peripheral blood. Umbilical cord blood. Bone marrow. Outline the principle of SC transplantation. Describe the storage and indications of stem cells. Outline the early and late complications of SCT.
PHARMACOLOGY				
42	Pharmacology 1	MSAA	Anti-coagulant and thrombolytic Agents	<ol style="list-style-type: none"> Classify Anti-coagulant and thrombolytic Agents. Explain the mechanism of action of Anti-coagulant and thrombolytic Agents. Describe pharmacokinetics, basic uses and side effects of Anti-coagulant and thrombolytic Agents. Briefly describe the agents used in the treatment of haemophilia.
43	Pharmacology 2	SDA	Anti-Platelet Agents	<ol style="list-style-type: none"> Classify anti-platelet agents. Explain the mechanism of action of anti-platelet agents. Describe pharmacokinetics, basic uses and side effects of anti-platelet agents.

COURSE CONTENT (Practical /CAL/PPD/ECE/ Forum /PBL)

No.	Discipline	Lecturer	Title	Learning Outcome
PRACTICAL				
1	Practical Anatomy	NFMN	Gross anatomy and Histology of lymphoid organs	<ol style="list-style-type: none"> 1. Identify the tonsillar fossa. 2. Identify the anterior and posterior tonsillar pillars. 3. Identify the gross anatomical features of the spleen 4. Identify the structures passing through the hilum of the spleen 5. Identify the location of the thymus. 6. Identify the histological features of lymphoid organs (palatine tonsil, spleen, thymus and lymph node).
2	Practical Pathology 1	UYH	Blood Cells Count and morphology	<ol style="list-style-type: none"> 1. Understands the principles of manual and automated white cell count, platelet count, reticulocyte count, and differential white blood cell count. 2. Identify the normal morphology of blood cells in stained blood smear.
3	Practical Pathology 2	UYH	Basic Haematological Investigations	<ol style="list-style-type: none"> 1. Identifies the haemoglobin concentration measurement using the cyanmethaemoglobin method and alternative methods. 2. Performs the packed cell volume measurement. 3. Describes erythrocytes sedimentation rate with regards to its types, principle and procedure. 4. Describes the plasma viscosity measurement. 5. Understands the red blood cell indices with regards to their types, calculation and interpretation. 6. Describes the haemoglobin electrophoresis with regards to its principle, types and interpretation.
4	Practical Pathology 3	UYH	RBC Pathology (Microscopic)	<ol style="list-style-type: none"> 1. Demonstrate abnormal RBC morphology and their descriptive terminology. 2. Demonstrate data interpretation, RBC morphology changes and further investigations (case study) in: <ul style="list-style-type: none"> ○ IDA. ○ Megaloblastic anaemia. ○ Hereditary spherocytosis. ○ Sickle cell disease. ○ Glucose-6-phosphate dehydrogenase deficiency. ○ Microangiopathic haemolytic anaemia. ○ α-thalassaemia. ○ β-thalassaemias.

No.	Discipline	Lecturer	Title	Learning Outcome
5	Practical Pathology 4	AD	Pretransfusion testing (ABO and Rh Blood Group System)	<ol style="list-style-type: none"> 1. Performs the blood grouping by tube method. 2. Calculate the agglutination reaction grading and scoring. 3. Explains the gel technique for blood grouping with its principle, application and advantages. 4. Show the tile method of blood grouping and its limitations. 5. Demonstrate the compatibility testing (group, screen and hold) and the cross-match types.
6	Practical Pathology 5	UYH	Haemostasis	<ol style="list-style-type: none"> 1. Demonstrate the blood sample collection for coagulation tests. 2. Explain the principles of clot-based coagulation screening tests. 3. Performs prothrombin time (activate partial thromboplastin time) test, calculate the international normalised ratio (INR) and interpret their results. 4. Explain fibrin (ogen) degradation products and D-dimer assay. 5. Demonstrates the skin bleeding time.
7	Practical Pathology 6	UYH	WBC Pathology (Microscopic)	<ol style="list-style-type: none"> 1. Differentiates the morphology of myeloblast and lymphoblast cells. 2. Differentiates the FAB and WHO classifications of acute leukaemic leukemia. 3. Distinguishes the WHO classification of acute myeloid leukaemia 4. Demonstrates the peripheral blood and bone marrow morphology study for cases of ALL, AML, CML and CLL.
FORUM (SGD)				
1	Immunology SGD 1	RAR	Basic Immunology	<p>Apply the immunology knowledge to explain the importance of vaccination in infectious disease</p> <ol style="list-style-type: none"> 1- Apply the topics and LOs in basic immunology and immunization
2	Immunology SGD 2	MA	Clinical Immunology	<p>Apply the concept of immunology in obtaining successful graft transplantation</p> <ol style="list-style-type: none"> 1. Apply the topics and LOs in basic immunology and organ transplantation

No.	Discipline	Lecturer	Title	Learning Outcome
3	Pathology Forum 1	UYH	Haemopoiesis, Nutritional and haemolytic anaemias	Interactive session as discussion for: <ol style="list-style-type: none"> 1- All the topics and LOs involved in teaching of hemopoiesis, Nutritional and haemolytic anaemias. 2- Correlation of the mechanisms of different nutritional and haemolytic anaemias with their clinical features. 3- Interrelating the investigations with the diagnosis of different nutritional and haemolytic anaemias and their clinical features.
4	Pathology Forum 2	AD - UYH	Blood transfusion and haemostasis	Interactive session as discussion for: <ol style="list-style-type: none"> 1- All the topics and LOs involved in teaching the blood group systems, blood transfusion principles and its complications as well as disorders of haemostasis. 2- Correlation of the mechanisms blood transfusion complications and disorders of haemostasis with their clinical features. 3- Interrelating the investigations in blood transfusion with the diagnosis of different blood transfusion complications and disorders of haemostasis.
5	Pathology Forum 3	UYH	Leukaemias and lymphomas	Interactive session as discussion for: <ol style="list-style-type: none"> 1- All the topics and LOs involved in teaching of leukaemias and lymphomas. 2- Correlation of the mechanisms of leukaemias and lymphomas with their clinical features. 3- Interrelating the investigations with the diagnosis of different leukaemias and lymphomas and their clinical features.
ECE				
1	ECE 1	AD, KAJ, MMT	Common symptoms in haematology diseases	<ul style="list-style-type: none"> • Perform basic history taking for common symptoms in haematology diseases <ul style="list-style-type: none"> - Bleeding - Easy bruising - Lymph node swelling - Frequent infection - Lethargy (Students will be divided into 3 groups)
2	ECE 2	AD, KAJ, MMT	Physical examination in haematology and venipuncture	<ol style="list-style-type: none"> 1. Display the ability to inspect for pallor and jaundice – sites to look for these signs. 2. Display the ability to identify and palpate major superficial lymph nodes in human body. 3. Display the ability to identify the important blood vessels for venepuncture and arterial blood gases. (Students will be divided into 3 groups)

No.	Discipline	Lecturer	Title	Learning Outcome
1	PPD	Dr. Abdul Rahman bin Mohamed (AM) (Medical Education Unit)	Learning strategies for medical student	<ul style="list-style-type: none"> Understand principles of adult learning to enhanced achievements Differentiate between learning objectives and learning outcome Understand the outcome based education (OBE) and alignments of Los Reflect on own learning style and its likely impact on achievement score Know the educational taxonomy for cognitive, skills and affective domains
PBL				
1	PBL1	Immunology: AIDS		ZAO, USMR, MH, NHAB, NB, SDA
2	PBL2	Haematology: Anaemia		USMR, NM, MA, NIAR, RAR, KAJ
3	PBL3	Haematology: Leukaemia		MH, MMT, NFMN, TZ, UYH, MSAA

REFERENCES

Anatomy	1	Moore, K.L., Dalley, Arthur F., Agur, Anne M.R. (2013). Clinically Oriented Anatomy, 7th edition. Philadelphia, Williams & Wilkins
	2	Ross, M.H., Kaye, G.I. & Pawlina, W. (2016). Histology – Text and Atlas. 7th edition, Philadelphia, Lippincott Williams & Wilkins
	3	Sadler, T W. (2015). Langman's Medical Embryology, 13th edition. Philadelphia, Lippincott Williams & Wilkins
	4	Snell, Richard S. (2010). Clinical Neuroanatomy, 7th edition, Philadelphia, Lippincott Williams & Wilkins
	5	Netter, F. H., (2014). Atlas of Human Anatomy, 6th edition, Elsevier.
Immunology	1	Janeway, C., Murphy, K.P., Travers, P. and Walport, M., (2008). Janeway's immuno biology.
	2	Levinson, W.E., (2018). Review of Medical Microbiology and Immunology 15E. McGraw Hill Professional.
Haematology	1	Hoffbrand A.V, Moss P.A H, Pettit J. E. (2011). Essential Haematology, 6th edition, Wiley-Blackwell.
	2	Contreras M. (2008). ABC of Transfusion, 4th edition, Wiley-Blackwell.
	3	Bain B.J., Bates I., Laffan M. A., Lewis S. M. (2012). Practical hematology. 12th edition, Churchill Livingstone, Elsevier.
Pharmacology	1	Katzung B, Trevor A. (2015). Basic and Clinical Pharmacology, 13th edition. McGraw-Hill Education. Lange.
	2	Rang HP, Ritter JM, Flower RJ, Henderson G, (2016). Rang & Dale's Pharmacology, 8th edition. Elsevier Churchill-Livingstone
	3	Whalen K, (2015). Lippincott Illustrated Reviews: Pharmacology, 6th edition. Wolter Kluwer Lippincott Williams Wilkins.
PPD	1	Ellen E. Pastorino, Susann M. Doyle-Portillo. What is Psychology? 2nd edition (2009). Thomson learning, Inc.
	2	Kosslyn, S.M. & Rosenberg, Robin, S. Fundamentals of Psychology in Context, 3rd edition (2007). Pearson Education
ECE	1	Hutchinson's Clinical Examination: A systemic guide to physical diagnosis, 6th edition (2010), Churchill Livingstone.
	2	Macleod's Clinical Examination.13th edition, (2013), Churchill Livingstone. 3. Kumar and Clark's Clinical Medicine, 8th Edition.

**BACHELOR OF MEDICINE & BACHELOR OF SURGERY (MBBS) PROGRAMME,
PRECLINICAL (PHASE I) (SEMESTER 2, YEAR 1), ACADEMIC SESSION 2021 / 2022**

WEEK 1		COURSE 3: HAEMATOLOGY AND IMMUNOLOGY					Course Coordinator: AP Dr. Uday Younis Hussein		
TIME DATE	8.30 – 9.30		10.00 – 11.00		11.30 – 12.30		2.30 – 3.00	3:30 – 4.34	4:30 – 5.00
SUNDAY 29.05.2022	Introduction to course (09:00-09:30) UYH	BREAK (9.30 – 10.00)	SELF STUDY	BREAK (11.00 – 11.30)	Lymphoreticular system NFMN	BREAK (12.30 - 02.00)	SELF STUDY		
MONDAY 30.05.2022	Antigen and Antibody RAR		SELF STUDY		Innate Immunity RAR		SELF STUDY		
TUESDAY 31.05.2022	Human leukocyte antigen (HLA) RAR		SELF STUDY		Lymphopoiesis RAR		PRACTICAL ANATOMY GROSS ANATOMY AND HISTOLOGY OF LYMPHOID ORGANS Mmikro, MBiokim AFMH,AKNH,MFAB,RM		
WEDNESDAY 01.06.2022	Adaptive Immunity – Cell Mediated Immunity RAR		SELF STUDY		Adaptive Immunity - Humoral Mediated Immunity RAR		EXTRACURRICULUM ACTIVITIES		
THURSDAY 02.06.2022	Organ Transplantation and Rejection MA		SELF STUDY		Hypersensitivity MA		PBL CASE 1 SESSION 1 (BT 6,9,10,11,12, 13) ZAO, USMR, MH, NHAB, NB, SDA		
							SELF STUDY		

LOCATION: Face to face (F2F) Teaching Will Be Conducted in Dewan Kuliah B (DK-B).

**BACHELOR OF MEDICINE & BACHELOR OF SURGERY (MBBS) PROGRAMME,
PRECLINICAL (PHASE I) (SEMESTER 2, YEAR 1), ACADEMIC SESSION 2021 / 2022**

WEEK 2		COURSE 3: HAEMATOLOGY AND IMMUNOLOGY					Course Coordinator: AP Dr. Uday Younis Hussein		
TIME DATE	8.30 – 9.30		10.00 – 11.00		11.30 – 12.30		2.30 – 3.00	3:30 – 4.30	4:30 – 5.00
SUNDAY 05.06.2022	Autoimmunity MA		SELF STUDY		Principles of immunity to infection MA		FORUM BASIC IMMUNOLOGY		SELF STUDY
MONDAY 06.06.2022	NATIONAL HOLIDAY (Agong's Birthday)								
TUESDAY 07.06.2022	Congenital (Primary) Immunodeficiency MA		Tumour Immunology RAR		Acquired Immunodeficiency syndrome (AIDS) SIS		SELF STUDY		SELF STUDY
WEDNESDAY 08.06.2022	Immunisation RAR	BREAK (9.30 – 10.00)	Blood Physiology and thrombopoiesis UYH	BREAK (11.00 – 11.30)	Erythropoiesis UYH	BREAK (12.30 – 02.00)	EXTRACURRICULUM ACTIVITIES		
THURSDAY 09.06.2022	Granulopoiesis UYH		PBL CASE1, GROUP DISCUSSION		Non-Neoplastic Disorders of white blood cells UYH		PRACTICAL HEMATOLOGY 1 Blood Cells Count and Basic Haematological Investigations Mmikro, MBiokim SAMH,UAMY,TZM		

LOCATION: Face to face (F2F) Teaching Will Be Conducted in Dewan Kuliah B (DK-B).

**BACHELOR OF MEDICINE & BACHELOR OF SURGERY (MBBS) PROGRAMME,
PRECLINICAL (PHASE I) (SEMESTER 2, YEAR 1), ACADEMIC SESSION 2021 / 2022**

WEEK 3		COURSE 3: HAEMATOLOGY AND IMMUNOLOGY					Course Coordinator: AP Dr. Uday Younis Hussein		
TIME DATE	8.30 – 9.30		10.00 – 11.00		11.30 – 12.30		2.30 – 3.00	3:30 – 4.30	4:30 – 5.00
SUNDAY 12.06.2022	Structure and function of red blood cell and haemoglobin UYH	BREAK (9.30 – 10.00)	SELF STUDY	BREAK (11.00 – 11.30)	Iron, VitamineB ₁₂ and Folate UYH	BREAK (12.30 - 02.00)	FORUM CLINICAL IMMUNOLOGY		SELF STUDY
MONDAY 13.06.2022	Hypochromic Anaemias and Iron Overload UYH		SELF STUDY		Megaloblastic Anaemia UYH		PBL CASE 1 SESSION 2 (BT 6,9,10,11,12, 13) ZAO, USMR, MH, NHAB, NB, SDA		
TUESDAY 14.06.2022	Haemolytic Anaemias (Membranopathy) UYH		SELF STUDY		QUIZ 1 IMMUNOLOGY		PRACTICAL HEMATOLOGY 2 Blood Cells Count and Basic Haematological Investigations Mmikro, MBiokim SAMH,UAMY,TZM		
WEDNESDAY 15.06.2022	Enzymopathy and immune haemolytic anaemias UYH		SELF STUDY		Thalassaemias UYH		EXTRACURRICULUM ACTIVITIES		
THURSDAY 16.06.2022	Haemoglobinopathies (Hb-S and Hb-E diseases) UYH		SELF STUDY		SELF STUDY		PPD Learning strategies for medical student AM		

LOCATION: Face to face (F2F) Teaching Will Be Conducted in Dewan Kuliah B (DK-B).

**BACHELOR OF MEDICINE & BACHELOR OF SURGERY (MBBS) PROGRAMME,
PRECLINICAL (PHASE I) (SEMESTER 2, YEAR 1), ACADEMIC SESSION 2021 / 2022**

WEEK 4		COURSE 3: HAEMATOLOGY AND IMMUNOLOGY					Course Coordinator: AP Dr. Uday Younis Hussein		
TIME DATE	8.30 – 9.30		10.00 – 11.00		11.30 – 12.30		2.30 – 3.00	3:30 – 4.30	4:30 – 5.00
SUNDAY 19.06.2022	SELF STUDY	BREAK (9.30 – 10.00)	Aplastic Anaemia UYH	BREAK (11.00 – 11.30)	ABO and minor blood group systems AD	BREAK (12.30 - 02.00)	PRACTICAL HEMATOLOGY 3 RBC PATHOLOGY (MICROSCOPIC) Mmikro, MBIokim RK,AM,AA		SELF STUDY
MONDAY 20.06.2022	Principles of Blood Transfusion AD		SELF STUDY		SELF STUDY		PBL CASE 2 SESSION 1 (BT 3,9,10,11,12, 13) USMR, NM, MA, NIAR, RAR, KAJ		
TUESDAY 21.06.2022	Immediate blood transfusion reactions AD		SELF STUDY		Delayed and other blood transfusion reactions AD		FORUM HEMATOLOGY 1 HAEMOPOIESIS, NUTRITIONAL AND HAEMOLYTIC ANAEMIAS		
WEDNESDAY 22.06.2022	Haemostasis UYH		SELF STUDY		Bleeding disorders: vascular and platelets defects UYH		EXTRACURRICULUM ACTIVITIES		
THURSDAY 23.06.2022	Inherited coagulation disorders UYH		SELF STUDY		SELF STUDY		PRACTICAL HEMATOLOGY 4 Pretransfusion Testing (ABO and Rh Blood Group System) Mmikro, MBIokim RK,AM,AA		

LOCATION: Face to face (F2F) Teaching Will Be Conducted in Dewan Kuliah B (DK-B).

**BACHELOR OF MEDICINE & BACHELOR OF SURGERY (MBBS) PROGRAMME,
PRECLINICAL (PHASE I) (SEMESTER 2, YEAR 1), ACADEMIC SESSION 2021 / 2022**

WEEK 5		COURSE 3: HAEMATOLOGY AND IMMUNOLOGY					Course Coordinator: AP Dr. Uday Younis Hussein	
TIME DATE	8.30 – 9.30	10.00 – 11.00		11.30 – 12.30	2.30 – 3.00	3:30 – 4.30	4:30 – 5.00	
SUNDAY 26.06.2022	Acquired coagulation disorders UYH	PBL CASE2, GROUP DISCUSSION			PRACTICAL HEMATOLOGY 5 HAEMOSTASIS Mmikro, MBIokim SAMH,UAMY,TZM		SELF STUDY	
MONDAY 27.06.2022	Acute Leukaemias UYH	SELF STUDY	BREAK (11.00 – 11.30)	Chronic Myeloid Leukaemia UYH	PBL CASE 2 SESSION 2 (BT 6,9,10,11,12, 13) USMR, NM, MA, NIAR, RAR, KAJ			
TUESDAY 28.06.2022	Myeloproliferative disorders UYH	SELF STUDY	BREAK (11.00 – 11.30)	SELF STUDY	FORUM HEMATOLOGY 2 BLOOD TRANSFUSION AND HAEMOSTASIS			
WEDNESDAY 29.06.2022	Lymphomas and Chronic lymphocytic leukaemia UYH	PBL CASE 3 SESSION 1 (BT 3,9,10,11,12, 13) MH, MMT, NFMN, TZ, UYH, MSA			EXTRACURRICULUM ACTIVITIES			
THURSDAY 30.06.2022	Introduction to haematology diagnosis UYH	PBL CASE3, GROUP DISCUSSION			PRACTICAL HEMATOLOGY 6 WBC PATHOLOGY (MICROSCOPIC) Mmikro, MBIokim SAH,RM			

LOCATION: Face to face (F2F) Teaching Will Be Conducted in Dewan Kuliah B (DK-B).

**BACHELOR OF MEDICINE & BACHELOR OF SURGERY (MBBS) PROGRAMME,
PRECLINICAL (PHASE I) (SEMESTER 2, YEAR 1), ACADEMIC SESSION 2021 / 2022**

WEEK 6		COURSE 3: HAEMATOLOGY AND IMMUNOLOGY					Course Coordinator: AP Dr. Uday Younis Hussein		
TIME DATE	8.30 – 9.30	BREAK (9.30 – 10.00)	10.00 – 11.00	BREAK (11.00 – 11.30)	11.30 – 12.30	BREAK (12.30 – 02.00)	2.30 – 3.00	3:30 – 4.30	4:30 – 5.00
SUNDAY 03.07.2022	Bone Marrow Aspirate and Biopsy UYH		Molecular and immunological Investigations UYH		SELF STUDY		FORUM HEMATOLOGY 3 LEUKAEMIAS AND LYMPHOMAS	SELF STUDY	
MONDAY 04.07.2022	Anti-Platelet Agents SDA		SELF STUDY		QUIZ 2 HEMATOLOGY		ECE 1 Common symptoms in haematology diseases MKK 1,2 and 3 AD, KAJ, MMT		
TUESDAY 05.07.2022	Stem cell transplantation UYH		SELF STUDY		SELF STUDY		PBL CASE 3 SESSION 2 (BT 6,9,10,11,12, 13) MH, MMT, NFMN, TZ, UYH, MSAA		
WEDNESDAY 06.07.2022	Anti-coagulant and thrombolytic Agents MSAA		SELF STUDY		SELF STUDY		EXTRACURRICULUM ACTIVITIES		
THURSDAY 07.07.2022	SELF STUDY		SELF STUDY		QUIZ 3 HEMATOLOGY		ECE 2 Physical examination in haematology and venepuncture MKK 1,2 and 3 AD, KAJ, MMT		

LOCATION: Face to face (F2F) Teaching Will Be Conducted in Dewan Kuliah B (DK-B).

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