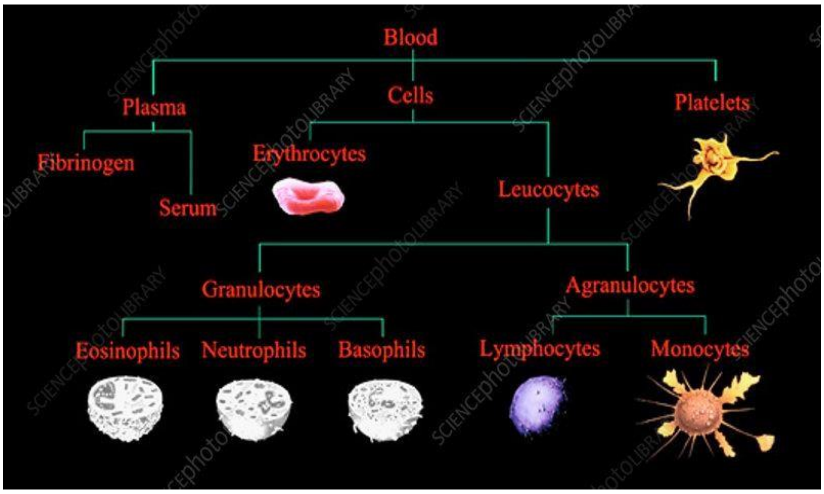
RAI FOUNDATION MEDICAL COLLEGE

HEMATOPOIETIC & LYMPHOID - I MODULE

FIRST YEAR MBBS, ACADEMIC SESSION 2024-25

BLOCK: I(H & L - I)
Academic Year: 2025
Duration: 3 Weeks



DISCLAIMER

- Developing a study guide is a dynamic process and undergoes iteration according to the needs and priorities.
- This study guide is subjected to the change and modification over the whole academic year.
- However, students are advised to use it as a guide for respective modules.
- It is to declare that the learning objectives (general and specific) and the distribution of assessment tools (both theory and practical) are obtained from Rai Foundation Medical College, Sargodha. These can be obtained from: https://www.uhs.edu.pk/
- The time tables are for guiding purpose. It is to advise that final timetables are always displayed over the notice boards of each lecture hall.
- Students are encouraged to provide feedback via module coordinator.

THIS STUDY GUIDE HAS BEEN PREPARED AND PROOF READ BY:

S No	NAME	DESIGNATION	DEPARTMENT	SIGNATURE
1.		Assistant Professor	Medical Education	
2.		Senior Demonstrator	Medical Education	
3.		Professor	Anatomy	
4.		Assistant Professor,	Physiology	
5.		Senior Demonstrator	Biochemistry	

Vision Statement

To be an institution of excellence in medical education, research, and patient care, fostering innovation, compassion, and a profound commitment to addressing healthcare challenges at local and global levels.

Mission Statement

We are dedicated to producing competent, ethical medical graduates who exemplify empathy, social accountability, and excellence in patient care. Through innovative education and critical thinking, they will advance clinical practice, scientific research, and lifelong learning to meet local and global healthcare needs.

Table of Contents

Module Committee

Sr.no	Name	Department	Role
1.		Principal	
2.		DME	Director
3.		DME	Assistant Director
4.		DME	Senior Demonstrator
5.		Professor Biochemistry	Block Coordinator
6.		Asst. Prof. Physiology	Module Coordinator
7.		Asst Professor DME	Module Developer
8.		Senior Demonstrator	Module Developer
9.		Asso. Prof. Anatomy	Member
10.		HOD Physiology	Member
11.		HOD Anatomy	Member
12.		Asso. Prof. Physiology	Member
13.		Physiology	Member
14.		Professor Medicine	Member
15.		Senior Demonstrator Pathology	Member
16.		Asso.Prof. Pharmacology	Member
17.		Senior Lecturer Community Medicine	Member
18.		Asst. Prof. Psychiatry (Behavioral Science)	Member

Introduction to Study Guide

It is an aid to Inform students how student learning program of the module has been organized, to help students organize and manage their studies throughout the module and guide students on assessment methods, rules and regulations.

The Study Guide:

- Communicates information on organization and management of the module.
- This will help the student to contact the right person in case of any difficulty.
- Defines the objectives which are expected to be achieved at the end of the module.
- Identifies the learning strategies such as lectures, small group teachings.

Module Outcomes:

- Provides a list of learning resources such as books, computer-assisted learning programs, web links, and journals, for students to consult in order to maximize their learning.
- Highlights information on the contribution of continuous on the student's overall performance.
- Includes information on the assessment methods that will be held to determine every student's performance.

Achievement of Objectives:

- Focuses on information pertaining to examination policy, rules and regulations.

Students will experience an integrated curriculum.

Integrated Curriculum:

An integrated curriculum is all about making connections, whether to real life or across the disciplines, about skills or about knowledge. An integrated curriculum fuses subject areas, experiences, and real-life knowledge together to make a more fulfilling and tangible learning environment for students. Integrated teaching means that subjects are presented as a meaningful whole. Students will be able to have better understanding of basic sciences when they repeatedly learn in relation to clinical examples. Case based discussions, computer-based assignments, early exposure to clinics, wards, and skills acquisition in skills lab are characteristics of integrated teaching program.

Marks Distribution

BLOCK I – Foundation + Hematopoietic & Lymphoid 1 Module					
Theory	Part I - MCQs	85 Marks	**Practical**	OSPE	56 Marks
				OSCE	16 Marks
	Part II- SEQs	35 Marks		OSVE	48 Marks
	Internal Assessment	30 Marks		Internal Assessment	30 Marks
	Total	150 Marks		Total	150 Marks

Theme	Subject	MCQ (1 Mark)	SEQ (5Mark each)	Marks	Oral / Practical / Clinical Exam			
					OSPE (08 Marks each)	OSCE (10 Marks each)	Structured OSVE (16 Marks each)	Marks
Normal Structure	Anatomy & Applied / Clinical	20	3	35	3	-	1	**40**
Normal Function	Physiology & Applied / Clinical	22	2	32	2	-	1	**32**
	Biochemistry & Applied / Clinical	22	2	32	2	-	1	**32**
Disease Burden & Prevention	Community Medicine Public Health	05	-	05	-	-	-	**-**
	Behavioral Sciences	05	-	05	-	-	-	**-**
Pathophysiology & Pharmaco-therapeutics	Pathology	06	-	06	-	-	-	**-**
	Pharmacology	05	-	05	-	-	-	**-**
CFRC	CFRC 1-1	-	-	-	-	1	-	**08**
PERLS	PERLS 1-1	-	-	-	-	1	-	**08**
		85	**7×5 = 35**	**120**	**08×7 = 56**	**2×08 = 16**	**3 × 16= 48**	**120**

Organization of Module

INTRODUCTION

"Blood is Life". Unlike any other organ, components of blood and immunity reflect/reveal disease processes in other organs as well. Therefore, studying blood is like opening a book to all aspects of medicine. Hence, this module has been designed to enable students to have a basic understanding about the normal structure, function and biochemistry of blood, immune and Lymphatic systems. Not only that, but students would also learn, when normal physiology and composition of blood and immune system is disturbed, what disorders result in our community. Emphasis has been given to incorporate deranged laboratory findings into the clinical problem solving.
This study guide has been developed to help guide you and keep you focused on the objectives for this module.
Welcome to the field of medicine and hope that the journey ahead will be exciting and fulfilling for you all!!

Teaching and learning strategies:

The following teaching / learning methods are used to promote better understanding:

1. Interactive Lectures
2. Hospital / Clinic visits
3. Small Group Discussion
4. Practical
5. Skills session in skill labs
6. Case-Based Learning (tutorials)
7. Directed Self-Learning

- **Interactive lectures:**
  An interactive lecture is an easy way for instructors to intellectually engage and involve students as active participants in a lecture - based class of any size.

- **Hospital / Clinic visits:**
  In small groups, students observe patients with signs and symptoms in hospital or clinical settings. This helps students to relate knowledge of basic and clinical sciences of the relevant module.

- **Small group discussion (SGD):**
  Students learn from each other. Everyone gets more practice at expressing their ideas. A two-way discussion is almost always more creative than individual thoughts. Social skills are practiced in a 'safe' environment e.g. tolerance, cooperation.

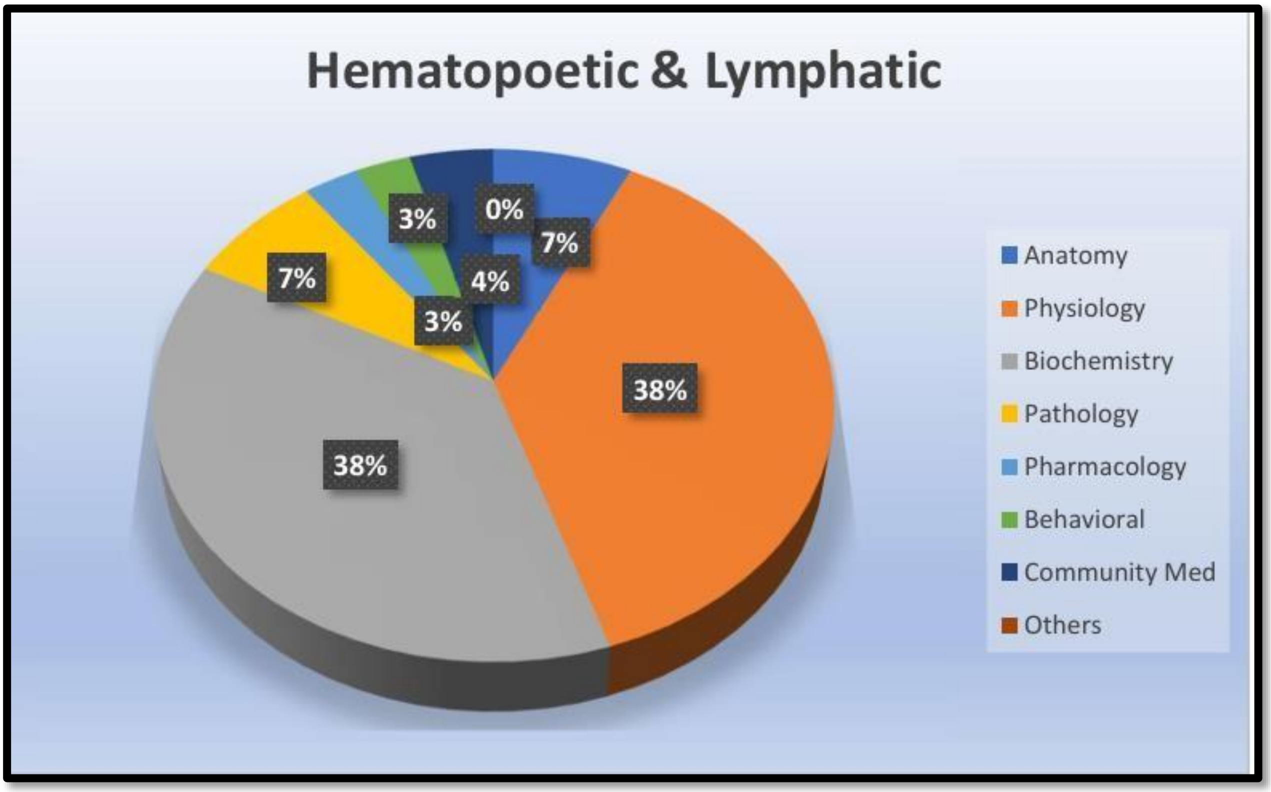
- **Skills session:**
  Skills relevant to respective module are observed and practiced where applicable in skills laboratory or Laboratories of various departments.

- **Case Based Learning (CBL):**

  A small group discussion format where learning is focused on a series of questions based on a clinical scenario. Students discuss and answer the questions by applying relevant knowledge gained previously in clinical and basic health sciences during the module and construct new knowledge. The CBD will be provided by the concerned department. It is an active learning & teaching strategy which promotes application of foundational knowledge in relevant clinical scenarios.

- **Directed Self-learning (DSL):**
  Directed Self-learning, which involves studying with indirect supervision in a classroom/Library, is a valuable way to learn and is quickly growing in popularity among parents and students.
  Students' assume responsibilities of their own learning through individual study, sharing and discussing with peers, seeking information from Learning Resource Centre, teachers and resource persons within and outside the college. Students can utilize the time within the college scheduled hours of self-study.

Integrating Disciplines of H & L I Module



Module Outcomes

By the end of Hematopoietic & Lymphoid (H & L) I module, students of 1st year MBBS will be able to

- Explain the function of all the organs / structures involved in this system and the mechanisms controlling them. (Spleen, lymph nodes, thymus, bone marrow, RBC's, WBCs and platelets.
- Explain the etiology and pathogenesis of common blood & lymphatic diseases, particularly those of importance in Pakistan.
- Explain the rationale for the use of common therapeutic agents for the diseases related to Blood and immunity.
- Describe the role of immunity in the body.
- Discuss the working & uses of laboratory instruments in diagnostic lab visit.
- Relate red cell indices with health and disease.
- Recognize ABO/RH blood grouping system.
- Describe the role of Reticuloendothelial system in the body.
- Describe the events of hemostasis.
- Extrapolate the biochemical aspects of plasma proteins.
- Discuss the pharmacological treatment of iron deficiency anemia.
- Discuss Blood composition and function.
- Discuss the role of liver in hemolytic anemia.
- Practice history taking of a patient presented with blood disorders.

Themes of H & L- I Module

S. No	Theme	Duration
1.	Anemia	1 week
2.	Coagulation	1 week
3.	Immunity	1 week

Specific Learning Objectives

ANATOMY				
GROSS ANATOMY				
Topic	**Specific Learning objectives**	**Teaching strategy**	**Levels C/P/A**	**Assessment**
Hematopoietic & Lymphoid Tissue	Identify and describe the components of the Hematopoietic & Lymphoid Tissue and their function	SGD (Dissection Hall & Museum)	C2	MCQs, SEQs, OSVE, OSPE
	Discuss location, coverings and relations of Spleen		C2	
	Describe Origin, course branches and distribution of Splenic artery		C2	
	Discuss Venous drainage of Spleen, Portal vein formation, tributaries, and area of drainage.		C2	
	Demonstrate location and relations of Thymus.		C2 /P	
	Identify age related changes in Thymus		C2 /P	
	Give the clinical correlates of urinary bladder		C3	
	Identify the gross features and surfaces of urinary bladder.		C2	
EMBRYOLOGY & POST- NATAL DEVELOPMENT				
Topic	**Specific Learning objectives**	**Teaching strategy**	**Levels C/P/A**	**Assessment**
Development of Spleen	Describe intrauterine development of spleen.	LGIS	C2	MCQs, SEQs, OSVE, OSPE
	Discuss anomalies in development of spleen.		C2	
MICROSCOPIC ANATOMY (HISTOLOGY) PRACTICAL				
Topic	**Specific Learning Objectives**	**Teaching strategy**	**Levels C/P/A**	**Assessment**
Spleen	Identify and draw and label the histological structure of spleen.	Practical	C2 / P	Integrated OSPE
Thymus & Tonsils	Identify, draw and label the histological structure of thymus & tonsils.	Practical	C2 / P	
Lymph nodes	Identify, draw and label the histological structure of MALT & lymph nodes.	Practical	C2 / P	

PHYSIOLOGY				
Topic	**Specific Learning Objectives**	**Teaching strategy**	**Levels C/P/A**	**Assessment**
Anemia	Define anemia.	LGIS	C1	MCQs, SEQs, OSVE, OSPE
	Explain causes & morphology of anemia.		C2	
	Classify anemia on the basis of morphology and cause.		C3	

	Discuss the effects of anemia on the body.		C2	
Polycythemia	Define polycythemia.	LGIS	C1	
	Explain types of polycythemias.		C2	
	Discuss the effects of polycythemia on the body.		C2	
Hemostasis	Define hemostasis.	LGIS/ SGD	C1	MCQs, SEQs, OSVE, OSPE
	Describe the mechanisms by which hemostasis is secured.		C2	
Platelets	Discuss the characteristics and functions of platelets.	LGIS/ SGD	C2	
	Explain the mechanism of formation of platelet plug.		C2	
Clotting Factors	Enlist the clotting factors in blood.	LGIS/ SGD	C1	MCQs, SEQs, OSVE,OSPE
	Explain the conversion of Prothrombin to Thrombin & formation of Fibrin Fibers		C2	
	Explain the Intrinsic & extrinsic clotting pathway.		C2	
	Explain the mechanism of anticoagulants used in laboratory.		C2	
	Explain the factors that prevent intravascular coagulation.		C2	
	Explain the role of Calcium ions in Intrinsic and Extrinsic pathways		C2	
	Enlist the vitamin K dependent clotting factors.		C1	
	Explain prothrombin time, International Normalized Ratio (INR), and its clinical significance.		C2	
	Explain the conditions that cause excessive bleeding.		C2	
	Define thrombocytopenia.		C2	
	Enlist the causes of thrombocytopenia.		C2	
	Explain the consequences of Thrombocytopenia.		C2	
Coagulation Disorders	Enlist causes of bleeding.	LGIS/ SGD	C1	MCQs, SEQs, OSVE,OSPE
	Explain the conditions that cause excessive bleeding.		C2	
	Define thrombocytopenia.		C2	
	Enlist the causes of thrombocytopenia.		C2	
	Explain the consequences of Thrombocytopenia.		C2	
Immunity	Define immunity.	LGIS/ SGD	C1	MCQs, SEQs, OSVE, OSPE
	Classify immunity.		C1	
	Explain Innate & humoral immunity		C2	
	Elaborate cell mediated immunity.			
	Describe the structure of antigen and immunoglobulin.		C2	

	Describe the role of Helper T-cells in cell mediated immunity.		C2	
	Enlist the types of Immunoglobulins along with their functions.		C1 / C2	
	Describe the mechanism of action of antibodies.	LGIS	C2	MCQs, SEQs, OSVE
	Elaborate the complement system.		C2	
Immune Tolerance	Elaborate Immune tolerance.		C1 / C2	
	Explain the process of clone selection during T cell processing.		C2	
Immunization	Discuss immunization.	LGIS/ SGD	C2	MCQs, SEQs, OSVE
	Define passive Immunity.		C1	
	Explain features and physiological basis of delayed reaction allergy.		C2	
	Explain features and physiological basis of Atopic Allergy.		C2	
	Explain features and physiological basis of anaphylaxis, urticaria and hay fever.		C2	
Blood Group Incompatibility	Discuss the pathophysiology, features and treatment of ABO and Rh incompatibility.	LGIS/ SGD	C2	MCQs, SEQs, OSVE, OSPE
	Enlist the changes that take place in the stored Blood.		C1	
Mismatched Blood Transfusion	Discuss the features and complications of mismatched blood transfusion reaction.	LGIS	C2	MCQs, SEQs, OSVE
	Describe the hazards of blood transfusion.		C2	
	Elaborate the transplantation of tissues and organs.		C2	
Tissue Transplantation	Explain the process of tissue typing.	LGIS	C2	MCQs, SEQs, OSVE
	Explain the prevention of graft rejection by suppressing immune system.		C2	
	PRACTICAL			
Topic	**Specific Learning Objectives**	**Teaching strategy**	**Levels C/P/A**	**Assessment**
Bleeding/ Clotting time	Interpret the Red Blood Cell Count, Hemoglobin concentration, Hematocrit and RBC Indices by Automated Cell Counter.	Lab	C2 / P	OSPE, OSCE
	Interpret the total leucocyte count, differential leucocyte count, platelet count by automated cell counter.		C2 / P	
	Determine Bleeding time & Clotting time.			

BIOCHEMISTRY				
Topic	**Specific Learning Objectives**	**Teaching strategy**	**Levels C/P/A**	**Assessment**
Hemoglobin and Its Types	Explain the steps of synthesis of hemoglobin.	LGIS / SGD	C2	MCQs, SEQs, OSVE
	Interpret Porphyria on basis of sign symptoms and data.		C3	
	Discuss the biochemical role and types of hemoglobin.		C2	
	Differentiate Hemoglobin and myoglobin		C2	
	Explain oxygen dissociation curve of hemoglobin and myoglobin and factors regulating them		C2	
	Interpret Carbon monoxide (CO) toxicity on the basis of sign and symptoms.		C3	
	Explain the role of 2,3 Bisphosphoglycerate (2,3 BPG) in fetal circulation.		C2	
Hemoglobino-pathies	Discuss haemoglobinopathies and their biochemical and genetic basis with special emphasis on sickle cell anemia, Thalassemia and methemoglobinemia.	LGIS / SGD	C2	MCQs, SEQs, OSVE
	Discuss the following types of anemia on the basis of signs and symptoms and laboratory data: 1. Hypochromic microcytic 2. Normochromic microcytic 3. Normochromic normocytic 4. Macrocytic (megaloblastic)		C2	
Heme Degradation	Discuss the degradation of heme in macrophages of reticuloendothelial system.	LGIS	C2	
	Describe the formation of bile pigments, their types and transport.		C2	
	Discuss the fate of bilirubin.		C2	
Hyperbiliru-binemias	Discuss hyperbilirubinemias and their biochemical basis.	LGIS / SGD	C2	MCQs, SEQs, OSVE
	Differentiate types of jaundice on basis of sign/symptoms and data.		C3	
	Evaluate the genetic basis of jaundice on the basis of lab investigations.		C3	
Plasma Proteins	Classify and explain the biomedical importance of each class of plasma proteins.	LGIS	C2	MCQs, SEQs, OSVE
Immunoglo-bulins	Explain the structure and biochemical role of immunoglobulins.	LGIS / SGD	C2	MCQs, SEQs, OSVE
	Describe the production, structure and functions of B cells, plasma cells, and antibodies (IgA, IgD, IgE, IgG, and IgM).		C2	
	Discuss the functions of the cytokines (ILs, TNFs, IFs, PDGF, and PAF).		C2	

	Interpret multiple myeloma on basis of given data.		C3	
Genetics	Explain and interpret pedigree of single gene defect i.e. sickle cell anemia (Autosomal recessive) and Beta Thalassemia (X linked recessive)		C2	MCQs, SEQs, OSVE

PRACTICAL BIOCHEMISTRY

Topic	Specific Learning Objectives	Teaching strategy	Levels C/P/A	Assessment
Jaundice & Anemias	Interpret types of jaundice on the basis of data	Practical Lab	C2 / P	OSPE / OSVE
	Perform estimation of bilirubin.		C2 / P	

Community Medicine

Topic	Specific Learning Objectives	Teaching strategy	Levels C/P/A	Assessment
Anemia	Describe the nutritional aspects of iron deficiency anemia and psychological aspects of diseases	LGIS	C2	MCQs
Communicable diseases	Enlist most common blood borne diseases in Pakistan.		C2	
	Describe the routes of spread of blood borne diseases.		C2	
Genetic diseases	Explain genetic counseling of parents.		C2	

BEHAVIORAL SCIENCE

Topic	Specific Learning Objectives	Teaching strategy	Levels C/P/A	Assessment
Counselling, informational care	Discuss psychological Counselling of patients and their families.	LGIS	C2	MCQs
	Identify factors and mechanisms to deal with the various psychosocial aspects of Hematopoietic System disorders (such as Sickle Cell Disease, Hemophilia, and Conditions of the Blood) on Individual, Family and Society.		C2	

AGING

Topic	Specific Learning Objectives	Teaching strategy	Levels C/P/A	Assessment
PRP & Glutahione	Discuss the role of platelets in Platelet-Rich Plasma (PRP) treatment in old age (for skin, hairs and joints)	LGIS	C2	MCQs
	Explain the role of glutathione in skin whitening.		C2	

PATHOLOGY				
Topic	**Specific Learning Objectives**	**Teaching strategy**	**Levels C/P/A**	**Assessment**
Blood Cells, Platelets and Blood Group	Discuss hematopoietic growth factors, mechanism of actions, uses and adverse effects.	LGIS	C2	MCQs
	Classify anemias according to underlying mechanism and Mean Corpuscular Volume/ Mean Corpuscular Hemoglobin (MCV/MCH)		C2	
	Discuss the causes and investigations of iron deficiency anemia and megaloblastic anemia.		C2	
	Classify the benign and malignant disorders of WBCs		C2	
	Discuss the causes leading to reactive leukocytosis.		C2	
	Interpret anemias on the basis of peripheral blood smear and bone marrow findings.		C3	
	Classify bleeding disorders.		C2	
	Discuss first line laboratory investigations for bleeding disorders.		C2	
	Describe the basic concept of blood grouping and acute hemolytic transfusion reaction		C2	

PHARMACOLOGY				
Topic	**Specific Learning Objectives**	**Teaching strategy**	**Levels C/P/A**	**Assessment**
Anemia	Describe the oral and parenteral iron preparations including their pharmacokinetics, uses, adverse Effects.	LGIS	C2	MCQs
	Discuss Vitamin B12 preparations.	LGIS	C2	
	Describe iron antidote.	LGIS	C2	

CLINICAL SKILLS (CSIM)				
Topic	**Specific Learning Objectives**	**Teaching strategy**	**Levels C/P/A**	**Assessment**
Venepuncture	Detail the steps of drawing blood from a vein.	Skill Lab	C2 / P	OSCE
Pallor	Check for pallor in the conjunctiva, tongue, palm of hands	Skill Lab	C2 / P	

PERLS (PROFESSIONALISM, ETHICS, RESEARCH, LEADERSHIP SKILLS)				
Topic	**Specific Learning Objectives**	**Teaching strategy**	**Levels C/P/A**	**Assessment**
Research	Discuss Science and scientific Evidence. Apply scientific method to a problem.	Assignment	C3	OSCE
Leadership	Identify gaps in learning through reflection		C4	

Time Tables:

The timetables for the module will be shared via WhatsApp groups and the notice boards in advance.

Assessment Tools

Theoretical knowledge is tested by a written examination system constituted by multiple choice questions (MCQ) and SEQs. The assessment of practical knowledge involves oral, spot, or objective structured practical examinations (OSPE).

Multiple Choice Questions (MCQ/SEQs):

Multiple choice questions (MCQ/SEQs) are a form of assessment for which students are asked to select the best choice from a list of answers.
MCQ/SEQ consists of a stem and a set of options. The stem is usually the first part of the assessment that presents the question as a problem to be solved; the question can be an incomplete statement which requires to be completed and can include a graph, a picture or any other relevant information. The options are the possible answers that the student can choose from, with the correct answer called the key and the incorrect answers called distractors.
Correct answer carries one mark, and incorrect 'zero mark'. There is NO negative marking.

Students mark their responses on specified computer-based sheet designed for the college.
The block exam will comprise of 85 MCQ/ 7 SEQs each of 5 marks and will be compiled according to the shared blueprint.

Short Essay Questions (SEQ)

Short Essay questions generally ask for brief, text-based responses. They can be used to assess students' understanding of and ability to think with subject matter content, discourage guessing of answers, in-depth knowledge of concepts, and formulation of an answer.

Objective Structured Practical or Clinical Examination (OSCE / OSPE)

- The content may assess application of knowledge, or practical skills.
- Student will complete task in define time at one given station.
- All the students are assessed on the same content by the same examiner in the same allocated time.
- A structured examination will have observed, interactive and rest stations.
- Observed and interactive stations will be assessed by internal or external examiners.
- Rest station is a station where there is no task given, and in this time student can organize his/her thoughts.
- The Block OSPE / OSCE will be comprise of 12 examined stations. The stations will be assigned according to the shared blueprint.

Internal Evaluation:

Internal evaluation is a process of quality review undertaken within an institution for its own ends. Internal evaluation criteria will be shared with faculty and 20 % on internal assessment will be observed in each module.

Attendance Requirement:
A minimum of 85% attendance is mandatory to sit for the examinations.

Professional Examination:
Criteria for appearing in Professional examination are according to rules and regulations shared by UHS which are available on their website. The criteria is;

- At least 85 % cumulative attendance in all blocks.
- An average 50 % minimum score in all blocks
- Certificate of good conduct from college
- Certificate of having appeared in all block exams conducted by the college

Learning Resources for Students

Anatomy

- Snell Clinical Anatomy 10th ed
- B.D Churasia
- Nelter Atlas
- Langman Embryology (12th Edi)
- Laiq Hassain Basic Histology (8th Ed)
- Difore Atlas Histology

Physiology

- Guyton and Hall physiology (14th Ed)
- Essentials of Medical Physiology by Mushtaq Ahmed

Biochemistry

- Harpers Illustrated Biochemistry (32nd Ed)
- Lippincott's Biochemistry
- Essentials of Medical Biochemistry vol 1&2 by Mushtaq Ahmed.

Community Medicine:

- Parks Textbook of Preventive and Social Medicine. K. Park (Editor)

Pathology:

- Vinary Kumar, Abdul K. Abbas and Nelson Fausto Robbins and Cotran, Pathologic basis of disease. WB Saunders.

Pharmacology:

- Basic and Clinical Pharmacology by Katzung, McGraw-Hill.

Behavioral Sciences:

- Handbook of Behavioral Sciences by Prof. Mowaddat H.Rana, 3rd Edition

Apart from these resource learning, students can consult books available in library or recommended by the specialty experts.