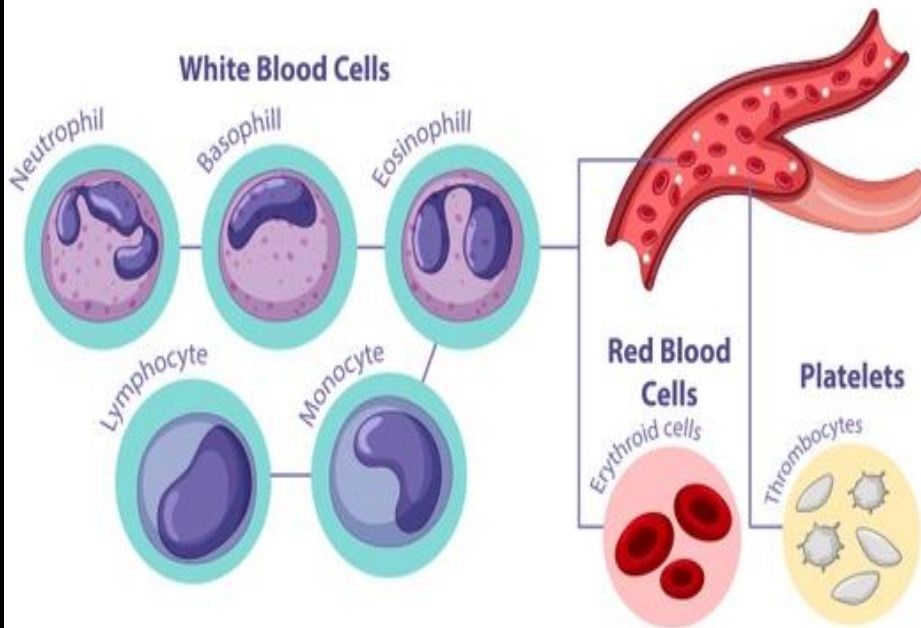


# TYPE OF BLOOD CELLS

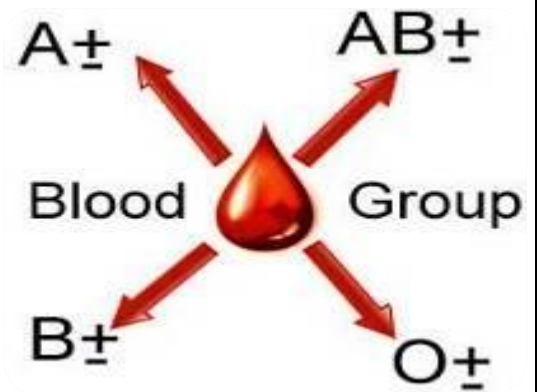


## STUDY GUIDE

### FIRST YEAR MBBS

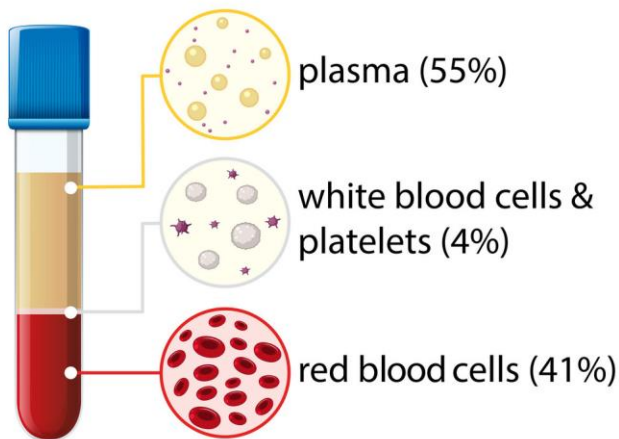
3<sup>RD</sup> MAY- 5<sup>TH</sup> JUNE 2021

DURATION: 5 WEEKS



# BLOOD-I MODULE

## Composition of Blood



**STUDY GUIDE FOR BLOOD-1 MODULE**

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1	Overview	3
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Module name: **Blood-1**Year: **One**Duration: **5 weeks (May–June 2021)**

Timetable hours: Lectures, Case-Based Learning (CBL), Team based Learning (TBL), Self-Study, Practical, Skills, Demonstrations

**MODULE INTEGRATED COMMITTEE**

<b>MODULE COORDINATOR:</b>	<ul style="list-style-type: none"><li>• Prof. Kashif Nisar (<b>Biochemistry</b>)</li></ul>
<b>CO-COORDINATOR:</b>	<ul style="list-style-type: none"><li>• Dr. Fizza Ali (<b>Pharmacology</b>)</li></ul>

**DEPARTMENTS' & RESOURCE PERSONS' FACILITATING LEARNING**

<b>BASIC HEALTH SCIENCES</b>		
<b>ANATOMY</b> Professor Zia-ul-Islam		
<b>BIOCHEMISTRY</b> Professor Kashif Nisar		
<b>PHYSIOLOGY</b> Professor Syed Hafeezul Hassan		
<b>DEPARTMENT OF HEALTH PROFESSIONS EDUCATION</b> <ul style="list-style-type: none"><li>• Professor Nighat Huda</li><li>• Dr. M. Suleman Sadiq</li><li>• Professor Sobia Ali</li><li>• Dr. Afifa Tabassum</li></ul>		
<b>LNH&amp;MC MANAGEMENT</b> Professor KU Makki, Principal LNH&MC Dr. Shaheena Akbani, Director A.A & R.T LNH&MC		
<b>STUDY GUIDE COMPILED BY: Department of Health Professions Education</b>		

## **INTRODUCTION**

### **WHAT IS A STUDY GUIDE?**

It is an aid to:

- Inform students how student learning program of the semester-wise module has been organized
- Help students organize and manage their studies throughout the module
- 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, clinical skills, demonstration, tutorial and case based learning that will be implemented to achieve the module objectives.
- Provides a list of learning resources such as books, computer assisted learning programs, web-links, journals, for students to consult in order to maximize their learning.
- Highlights information on the contribution of continuous and semester examinations on the student's overall performance.
- Includes information on the assessment methods that will be held to determine every student's Achievement of objectives.
- Focuses on information pertaining to examination policy, rules and regulations.

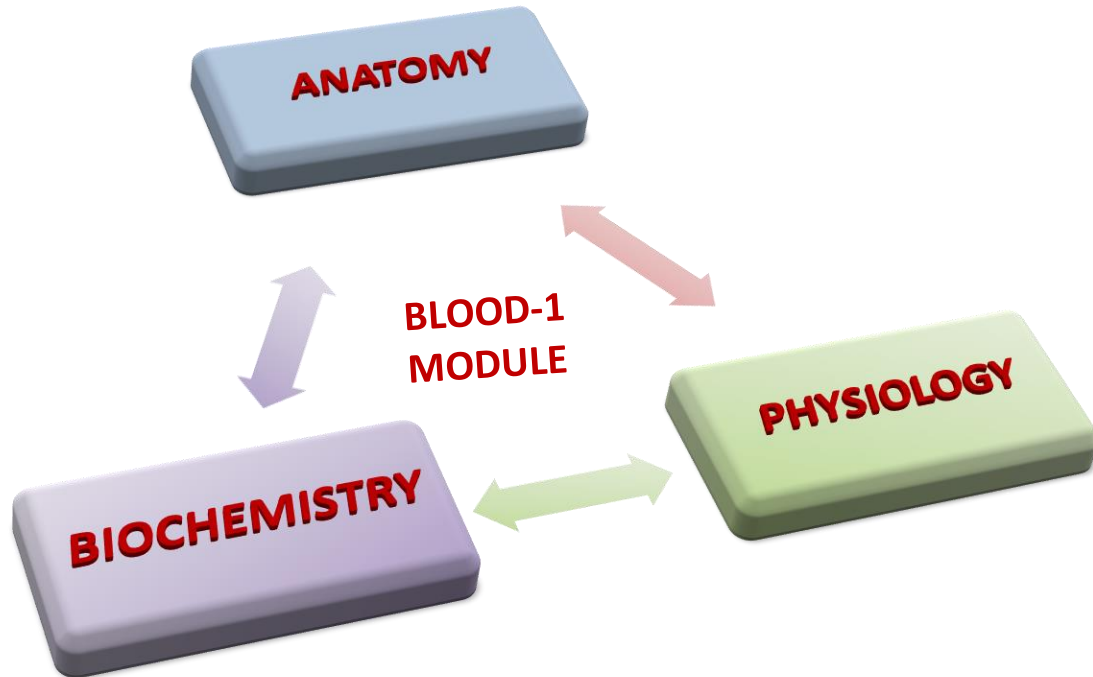
### **CURRICULUM FRAMEWORK**

Students will experience integrated curriculum.

**INTEGRATED CURRICULUM** comprises of system-based modules such as foundation and blood-1 which links basic science knowledge to clinical problems. 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 and physiotherapy department are characteristics of integrated teaching program.

# INTEGRATING DISCIPLINES OF BLOOD-1 MODULE



## LEARNING METHODOLOGIES

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

- Interactive Lectures
- Small Group Discussion
- Case- Based Learning
- Practicals
- Skills session
- E-Learning
- Self-Directed Study

## INTERACTIVE LECTURES

In large group, the lecturer introduces a topic or common clinical conditions and explains the underlying phenomena through questions, pictures, videos of patients' interviews, exercises, etc. Students are actively involved in the learning process.

**SMALL GROUP DISCUSSION:** This format helps students to clarify concepts acquire skills or attitudes. Sessions are structured with the help of specific exercises such as patient case, interviews or discussion topics. Students exchange opinions and apply knowledge gained from lectures, tutorials and self-study. The facilitator role is to ask probing questions, summarize, or re phrase to help clarify concepts.

**TEAM-BASED LEARNING:** A small group discussion format where learning is focused around a series of questions based on a clinical scenario. Students' discuss and answer the questions applying relevant knowledge gained in clinical and basic health sciences during the module.

- a) **Preparation before class:** Students must complete preparatory materials before a class or the start of the module. Materials may be text, visual or other, and set at a level that is appropriate to the students and the course.
- b) **In-class Readiness Assurance Testing:** Students complete an individual readiness assurance test (IRAT), consisting of 5 to 20 multiple choice questions. After submitting their individual answers, and they take the same test, the team RAT (TRAT), with their team. All members of each team share the same TRAT score, and both IRAT and TRAT scores count toward the students' grades.
- c) **Instructor Feedback:** The instructor reviews material from the RAT that seems to be difficult for students.
- d) **In-class application focused exercise:** The remainder of the session is taken up with exercises that help students learn how to apply and extend the knowledge that they have pre-learned and tested. Teams are given an appropriate problem or challenge, and must arrive at a consensus to choose a "best" solution out of options provided. Teams then display their answer choice, and the educator facilitates a classroom discussion between teams to explore the topic and the possible answers to the problem.

**PRACTICAL:** Basic science practicals related to anatomy, biochemistry and physiology are scheduled for student learning.

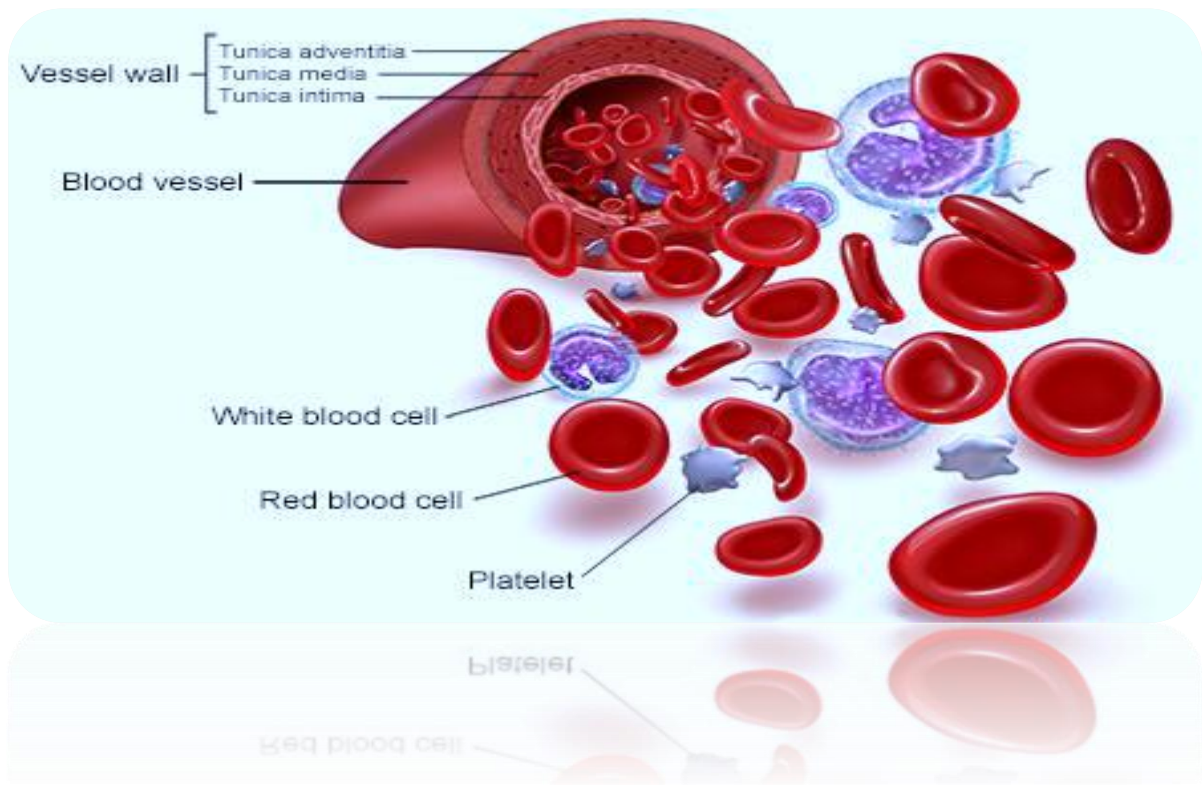
**SKILLS SESSION:** Skills relevant to respective module are observed and practiced where applicable in skills laboratory or Department of Physiotherapy.

**SELF DIRECTED STUDY:** Students' assume responsibilities of their own learning through individual study, sharing and discussing with peers, seeking information from Learning Resource Center, teachers and resource persons within and outside the college. Students can utilize the time within the college scheduled hours of self-study.

**E-LEARNING:** E-Learning is a strategy by which learning occurs through the utilization of electronic media, typically the Internet. The basic aspects of medical professionalism and ethics will be addressed through an e-learning course.

**MODULE 2: BLOOD-1****INTRODUCTION**

This module aims to provide an overview of the haematological system and basic understanding of hematopoiesis and hemostasis at the molecular level. The module will give the 1<sup>st</sup> year medical students, an opportunity to know the presentations of common hematological, immunological and inflammatory disorders. Overall, it will provide the students with the necessary factual knowledge and stimulate them to apply this in the interpretation of the disease.

**COMPOSITION & FUNCTION OF BLOOD**

**COURSE OBJECTIVES AND STRATEGIES**

At the end of the module the students will be able to:

***ANATOMY***

<b>TOPICS &amp; OBJECTIVES</b>	<b>LEARNING STRATEGY</b>
<b>HISTOLOGY</b>	
1. Identify components of hematopoietic system: RBCs, WBCs and Platelets.	Small Group Discussion & Practical
<b>Lymphoid tissue, Immune system and Thymus</b>	
2. Name the components of immune system and lymphoid tissue.	Interactive Lecture
3. Differentiate between central lymphoid organs and peripheral lymphoid organs	Interactive Lecture & Small Group Discussion
4. Describe the structure of lymph nodes	Interactive Lecture & Practical
5. Describe the structure and histological appearance of thymus.	Interactive Lecture & Practical
6. Discuss the clinical anatomy of lymphoid organs	Small Group Discussion & CBL
<b>Histology of Spleen and Tonsils</b>	
7. Define the structure and location of tonsils and spleen	Interactive Lecture & Practical
8. Describe histological features of tonsils and spleen	Interactive Lecture & Practical
<b>EMBRYOLOGY</b>	
<b>Development of blood</b>	
9. Define hematopoiesis. Discuss the process of development of blood elements.	Interactive Lecture
10. List the sites and sources of hematopoiesis before and after birth	Interactive Lecture

***BIOCHEMISTRY***

TOPICS & OBJECTIVES	LEARNING STRATEGY
HEMOGLOBIN	
Structure and Types of Hemoglobin	
1. Explain the structure and types of hemoglobin.	Interactive Lectures/Small Group Discussion
2. Discuss the biochemical function of hemoglobin	
3. Discuss the clinical significance of hemoglobin	
Oxygen Dissociation Curve	
4. Explain the biochemical basis of oxygen dissociation curve.	Interactive Lectures
5. Describe the Oxygen dissociation curve for Hemoglobin	
6. Describe the Oxygen dissociation curve for Myoglobin	
7. Describe the factors affecting binding of oxygen with hemoglobin	
8.Explain transportation of oxygen and carbon dioxide through hemoglobin	



Abnormalities of Hemoglobin Synthesis and Degradation	
9. Discuss Hemoglobin synthesis and its abnormalities, Porphyrrias & its types.	Interactive Lectures/ Small Group Discussion
10. Discuss the heme degradation pathway and hyperbilirubinemia.	
Hemoglobinopathies	
11. Explain the biochemical aspects of Hemoglobinopathies (Thalassemia, Sickle Cell anemia)	Interactive Lectures/ Small Group Discussion
VITAMINS & MINERALS	
Iron metabolism	
12. Discuss Iron metabolism in the body with its abnormalities	Interactive Lectures/ Small Group Discussion
13. Describe the biochemical functions, dietary sources, recommended daily intake and distribution of iron in the body	
14. Explain the mechanism of absorption, transport, storage, and elimination of iron	
15. Discuss the clinical significance of Iron deficiency and Iron overload	
Vitamin B12 & Folic acid	
16. Describe the biochemical functions, dietary sources and recommended daily intake of Vitamin B12 & Folic Acid	Interactive Lectures/ Small Group Discussion
17. Discuss the clinical significance of Vitamin B12 deficiency and Folic Acid deficiency	
Vitamins E & K	
18. Discuss Vitamin E metabolism in the body	Interactive Lectures/ Small Group Discussion
19. Describe the biochemical functions, dietary sources and recommended daily intake of Vitamin E	
20. Discuss the clinical significance of Vitamin E deficiency	
21. Discuss Vitamin K metabolism in the body	
22. Describe the biochemical functions, dietary sources and recommended daily intake of Vitamin K	
23. Discuss the clinical significance of Vitamin K deficiency	
Plasma Protein	
24. Explain the Biochemical basis for the difference in plasma and serum	Interactive Lectures/ Small Group Discussion
25. Explain the composition of plasma and plasma proteins.	
26. Discuss the separation techniques of plasma proteins	
27. Describe the individual plasma proteins and their biological functions	
28. Discuss the clinical abnormalities related to plasma proteins	
Immunoglobulins	
29. Define immunoglobulins	Interactive Lectures/ SGD
30. Describe their chemistry, structure and classification.	
31. Discuss the biochemical functions of immunoglobulin in human body	
32. Discuss the clinical significance of immune deficiency diseases	
Specimen collection	
33. Collect the blood specimen for biochemical analysis	Practical

<b>Spectrophotometer</b>	Practical
34. Demonstrate the use of spectrophotometer.	
<b>Flame Photometer</b>	
35. Demonstrate the use of Flame photometer	
<b>Estimation of Plasma Proteins</b>	
36. Discuss the role of plasma protein in disease and normal condition and use of electrophoresis for the detection of plasma proteins.	
<b>Electrophoresis</b>	
37. Demonstrate the electrophoresis and its application for the detection plasma proteins.	
<b>ELISA</b>	
38. Demonstrate the biochemical use of ELISA and its application in the detection of disease.	

**PHYSIOLOGY**

TOPICS & OBJECTIVES	LEARNING STRATEGY
Composition of blood & its cellular components	
1. Enumerate the functions of the cellular components of blood.	Interactive Lectures/Small Group Discussion
2. State the normal values of RBCs, WBCs & platelets.	
3. Define hematocrit, normal values & factors affecting hematocrit.	
Formation and development of RBCs (erythropoiesis)	
4. Discuss the different stages of RBCs formation	Interactive Lectures/ Small Group Discussion
5. List factors necessary for erythropoiesis.	
6. Discuss the significance of Reticulocyte count	
7. Discuss the role of Erythropoietin.	
Classification of anemia and significance of red cell indices	
8. Describe the morphological & etiological classification of anemia	Interactive Lectures/ Small Group Discussion
9. Discuss the significance of red cell indices and their normal values.	
Megaloblastic /iron, B12 folic def. anemia	
10. Discuss the etiology & microscopic picture of Megaloblastic and iron deficiency anemia	Interactive Lectures/ Small Group Discussion
11. Differentiate between Megaloblastic & Pernicious Anemia based on microscopic picture and red cell indices.	
Hemolysis and hemolytic anemia (hereditary spherocytosis, G6PD def, sickle cell disease)	
12. Discuss the types of hemolytic anemia viz	Interactive Lectures
I. Hereditary spherocytosis	
II. G6PD deficiency	
III. Sickle cell anemia	
IV. Erythroblastosis fetalis	

<b>Polycythemia</b>	
13. Define types of polycythemia	Interactive Lectures/ Small Group Discussion
14. Explain the effects of polycythemia on human body	
<b>Blood groups ABO/RH system</b>	
15. Explain the ABO(classical) and Rh system of blood grouping & their inheritance pattern.	Interactive Lectures/ Small Group Discussion
16. Define Agglutinin, agglutinin & agglutination.	
17. List various Rh antigens & Rh immune response.	
18. Name the transfusion reactions associated with mismatched blood transfusion.	
<b>Hemostasis &amp; role of Thrombocytes</b>	
19. Describe the events in Hemostasis	Interactive Lectures/ Small Group Discussion
20. Explain the mechanism of formation of platelet plug .	
21. Describe the role of Prothrombin in blood coagulation and clot formation.	
<b>Clotting cascade &amp; bleeding disorders</b>	
22. Explain intrinsic and extrinsic pathway for coagulation.	Interactive Lectures/ Small Group Discussion
23. Enumerate the clotting factors	
24. Describe the role of clotting factors in coagulation.	
<b>Hemorrhagic &amp; thromboembolic conditions</b>	
25. Explain the following hemorrhagic and Thrombo-embolic conditions:	Interactive Lectures/ Small Group Discussion
i. Hemophilia	
ii. Thrombocytopenia	
iii. Disseminated Intravascular Coagulation.	
26. Discuss the role of commonly used anticoagulants	
<b>Fibrinolytic mechanisms.</b>	
27. Explain the fibrinolytic mechanism and role of plasmin in lysis of blood clots.	Interactive Lectures/ Small Group Discussion
28. Discuss the role of fibrin & anti-thrombin III in anticoagulation.	
<b>Genesis and general characteristics of white blood cells</b>	
29. Describe the process of leukocyte genesis	Interactive Lectures/ Small Group Discussion
30. List various types of granulocytes and agranulocytes, their functions & normal values.	
<b>Functions of WBCs: Monocytes macrophage cell system.</b>	
31. Explain the significance of Reticuloendothelial system in body defense mechanism	Interactive Lectures/ Small Group Discussion
32. List various macrophages in different tissues of body.	
33. Discuss the role of passive immunity against infection.	
<b>Types and functions of lymphocytes</b>	
34. List the types of lymphocytes and their site of origin.	Interactive Lectures/ Small Group Discussion
35. Discuss the functions of T and B lymphocytes.	
36. Enumerate types of T lymphocytes & their functions.	
<b>Immunity its types (Innate)</b>	

37. Define immunity	Interactive Lectures/ Small Group Discussion
38. Classify immunity	
39. Describe the process of innate immunity	
Cell mediated Immunity	
40. Define cell mediated immunity	Interactive Lectures/ Small Group Discussion
41. List the cells involved in this immunity type	
42. Describe the process of cell mediated immunity	
Humoral immunity	
43. Define Humoral immunity	Interactive Lectures/ Small Group Discussion
44. List the cells involved in this immunity type	
45. Describe the process of humoral mediated immunity	
46. List the advantages of this immunity type	
Passive immunity and immunization	
47. Define passive immunity & immunization	Interactive Lectures/ Small Group Discussion
48. Differentiate between passive and active immunity	
49. Describe the process of immunization and its advantages	
50. Explain the Expanded Program on Immunization (EPI)	
Allergy and hypersensitivity	
51. Discuss the following types of hypersensitivity and allergic reactions:	Interactive Lectures/ Small Group Discussion
i. Urticaria	
ii. Anaphylaxis	
iii. Hay fever	
52. Discuss the role of Ig E in Immunity.	Practical
53. Demonstrate peripheral blood smear	
54. Perform tests for A,B,O, & Rh blood grouping	
55. Perform tests of bleeding time and clotting time.	
56. Differential Leukocyte Count (DLC) • List different types of WBCs and their normal values • Discuss the composition of Leishmain’s stain & its significance • Explain the methods of counting WBCs	
57. Determine Erythrocyte Sedimentation Rate	

**LEARNING RESOURCES**

<b>SUBJECT</b>	<b>RESOURCES</b>
<b>ANATOMY</b>	<p><b>A. <u>GROSS ANATOMY</u></b></p> <ol style="list-style-type: none"> <li>1. K.L. Moore, Clinically Oriented Anatomy</li> <li>2. Neuro Anatomy by Richard Snell</li> <li>3. <a href="https://www.kenhub.com/en/dashboard">https://www.kenhub.com/en/dashboard</a></li> </ol> <p><b>B. <u>HISTOLOGY</u></b></p> <ol style="list-style-type: none"> <li>1. B. Young J. W. Health Wheather's Functional Histology</li> </ol> <p><b>C. <u>EMBRYOLOGY</u></b></p> <ol style="list-style-type: none"> <li>1. KeithL. Moore.The Developing Human</li> <li>2. Langman's Medical Embryology</li> </ol>
<b>BIOCHEMISTRY</b>	<p><b>A. <u>TEXTBOOKS</u></b></p> <ol style="list-style-type: none"> <li>1. Harper's Illustrated Biochemistry</li> <li>2. Lehninger Principle of Biochemistry</li> <li>3. Biochemistry by Devlin</li> </ol>
<b>PHYSIOLOGY</b>	<p><b>A. <u>TEXTBOOKS</u></b></p> <ol style="list-style-type: none"> <li>1. Textbook Of Medical Physiology by Guyton And Hall</li> <li>2. Ganong'S Review of Medical Physiology</li> <li>3. Human Physiology by Lauralee Sherwood</li> <li>4. Berne &amp; Levy Physiology</li> <li>5. Best &amp; Taylor Physiological Basis of Medical Practice</li> </ol> <p><b>B. <u>REFERENCE BOOKS</u></b></p> <ol style="list-style-type: none"> <li>1. Guyton &amp; Hall Physiological Review</li> <li>2. Essentials Of Medical Physiology by Jaypee</li> <li>3. Textbook Of Medical Physiology by InduKhurana</li> <li>4. Short Textbook Of Physiology by Mrthur</li> <li>5. NMS Physiology</li> </ol>

**ASSESSMENT METHODS:**

- **Best Choice Questions(BCQs)** also known as MCQs (Multiple Choice Questions)
- **Objective Structured Practical/Clinical Examination (OSPE or OSCE)**

**BCQs:**

- A BCQ has a statement or clinical scenario of four options (likely answers).
- **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 LNHMC.

**OSCE:**

- All students rotate through the same series of stations in the same allocated time.
- At each station, a brief written statement includes the task. Student completes the given task at one given station in a specified time.
- Stations are observed, unobserved, interactive or rest stations.
- In unobserved stations, flowcharts, models, slide identification, lab reports, case scenarios may be used to cover knowledge component of the content.
- Observed station: Performance of skills /procedures is observed by assessor
- Interactive: Examiner/s ask questions related to the task within the time allocated.
- In Rest station, students in the given time not given any specific task but wait to move to the following station.

**Internal Evaluation**

- Students will be assessed comprehensively through multiple methods.
- 20% marks of internal evaluation will be added to JSMU final exam. That 20% may include class tests, assignment, practicals and the internal exam which will all have specific marks allocation.

**Formative Assessment**

Individual department may hold quiz or short answer questions to help students assess their own learning. The marks obtained are not included in the internal evaluation

**For JSMU Examination Policy, please consult JSMU website!**

**More than 75% attendance is needed  
to sit for the internal and final  
examinations**

**LNH&MC EXAMINATION RULES & REGULATIONS**

- Student must report to examination hall/venue, 30 minutes before the exam.
- **Exam will begin sharp at the given time.**
- No student will be allowed to enter the examination hall after 15 minutes of scheduled examination time.
- Students must sit according to their roll numbers mentioned on the seats.
- **Cell phones are strictly not allowed in examination hall.**
- If any student is found with cell phone in any mode (silent, switched off or on) he/she will be not be allowed to continue their exam.
- No students will be allowed to sit in exam without University Admit Card, LNMC College ID Card and Lab Coat
- Student must bring the following stationary items for the exam: Pen, Pencil, Eraser, and Sharpener.
- Indiscipline in the exam hall/venue is not acceptable. Students must not possess any written material or communicate with their fellow students.

**SCHEDULE:**

WEEKS	1 <sup>ST</sup> YEAR	MONTH
WEEK 1	FOUNDATION MODULE	1 <sup>st</sup> March 2021
WEEK 2		
WEEK 3		
WEEK 4		
WEEK 5		
WEEK 6		
WEEK 7		
WEEK 8		
WEEK 9		30 <sup>th</sup> April 2021
WEEK 1	BLOOD-1 MODULE	3 <sup>rd</sup> May 2021
WEEK 2		
WEEK 3		
WEEK 4		
WEEK 5		5 <sup>th</sup> June 2021
MID TERM EXAM*		

\*Final dates will be announced later