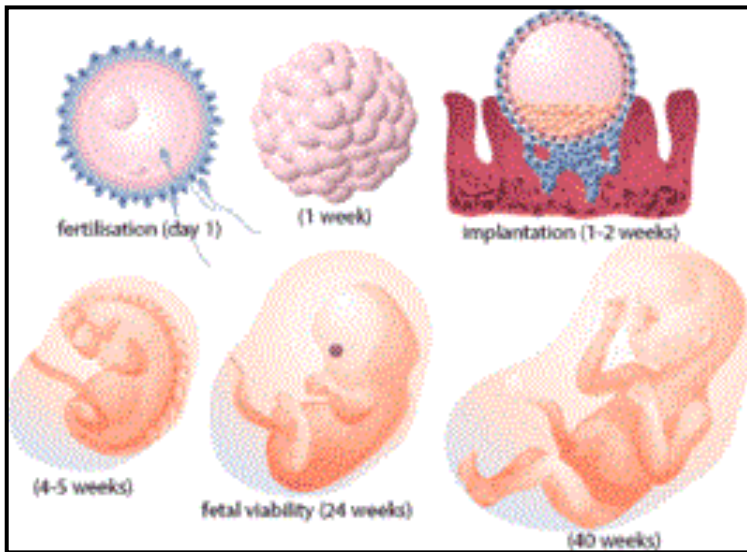


EMBRYOLOGY



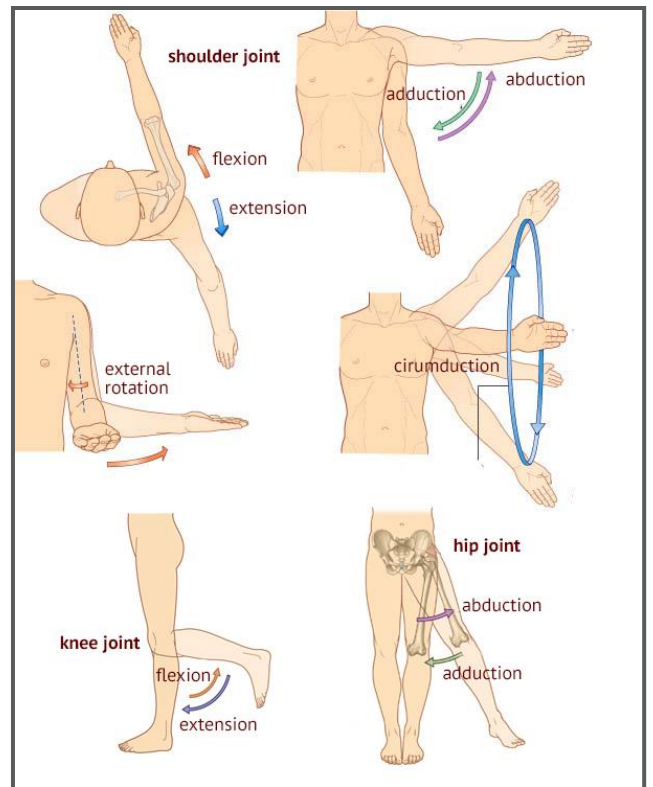
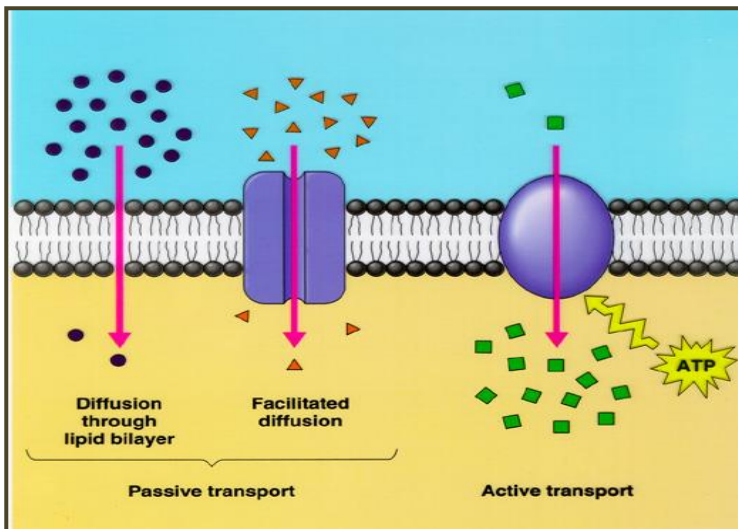
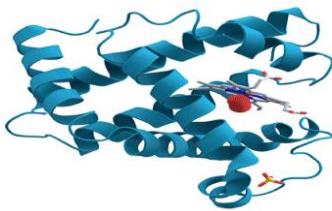
STUDY GUIDE

FOUNDATION MODULE

FIRST YEAR MBBS

3rd Feb – 13th March 2020
Duration: 6 weeks

PROTEINS



LIAQUAT NATIONAL HOSPITAL AND MEDICAL COLLEGE
Institute for Postgraduate Medical Studies & Health Science



STUDY GUIDE FOR FOUNDATION MODULE

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Module name: **Foundation**Year: **One**Duration: **6 weeks (Feb– March 2020)**

Timetable hours: Lectures, Case-Based Learning (CBL), Self-Study, Practical, Skills, Demonstrations, Visit to Wards & Laboratory

MODULE INTEGRATED COMMITTEE

MODULE COORDINATOR:	<ul style="list-style-type: none"> • Professor Zia-ul-Islam (Anatomy)
CO-COORDINATOR:	<ul style="list-style-type: none"> • Dr. Fizzah Ali (Pharmacology)

DEPARTMENTS & RESOURCE PERSONS FACILITATING LEARNING

BASIC HEALTH SCIENCES	CLINICAL AND ANCILLARY DEPARTMENTS
ANATOMY <ul style="list-style-type: none"> • Professor Zia-ul-Islam 	BIOETHICS <ul style="list-style-type: none"> • Dr. Saleha Shahzad
BIOCHEMISTRY <ul style="list-style-type: none"> • Dr. Kashif Nisar 	COMMUNICATION SKILLS <ul style="list-style-type: none"> • Mrs. Mehr Yahya
PHYSIOLOGY <ul style="list-style-type: none"> • Professor Syed Hafeezul Hassan 	
DEPARTMENT OF HEALTH PROFESSIONS EDUCATION	
<ul style="list-style-type: none"> • Professor Nighat Huda • Dr. M. Suleman Sadiq • Dr. Sobia Ali • Dr. Mehnaz Umair • Dr. Afifa Tabassum 	
LNH&MC MANAGEMENT	
<ul style="list-style-type: none"> • Professor KU Makki, Principal LNH&MC • Dr. Shaheena Akbani, Director A.A & R.T LNH&MC 	
STUDY GUIDE COMPILED BY:	
<ul style="list-style-type: none"> • Faiza Ambreen, Department of Health Professions Education 	

INTRODUCTION

WHAT IS A STUDY GUIDE?

It is an aid to:

- Inform students how student learning program 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 Term 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.

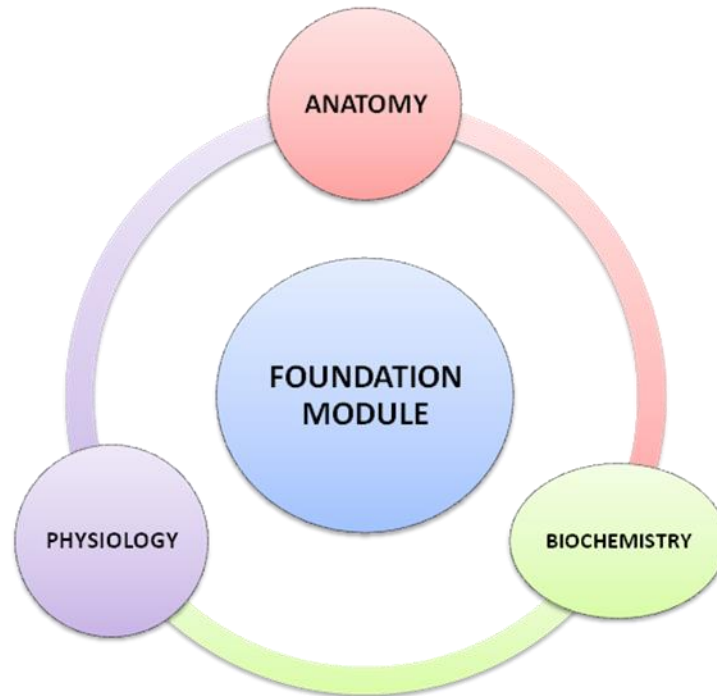
CURRICULUM FRAMEWORK

Students will experience *integrated curriculum*.

INTEGRATED CURRICULUM comprises system-based modules such as foundation and blood 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, and skills acquisition in skills lab are characteristics of integrated teaching program.

INTEGRATING DISCIPLINES OF FOUNDATION 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.

TEAM- BASED LEARNING: Team-Based Learning is an evidence based collaborative learning teaching strategy designed around units of instruction, known as "modules," that are taught in a three-step cycle: preparation, (b) in-class readiness assurance testing, and (c) application-focused exercise.

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.

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.

Instructor Feedback: The instructor reviews material from the RAT that seems to be difficult for students.

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.

SMALL GROUP DISCUSSION (SGD): 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 rephrase to help clarify concepts.

CASE- 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.

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.

MODULE 1 : FOUNDATION

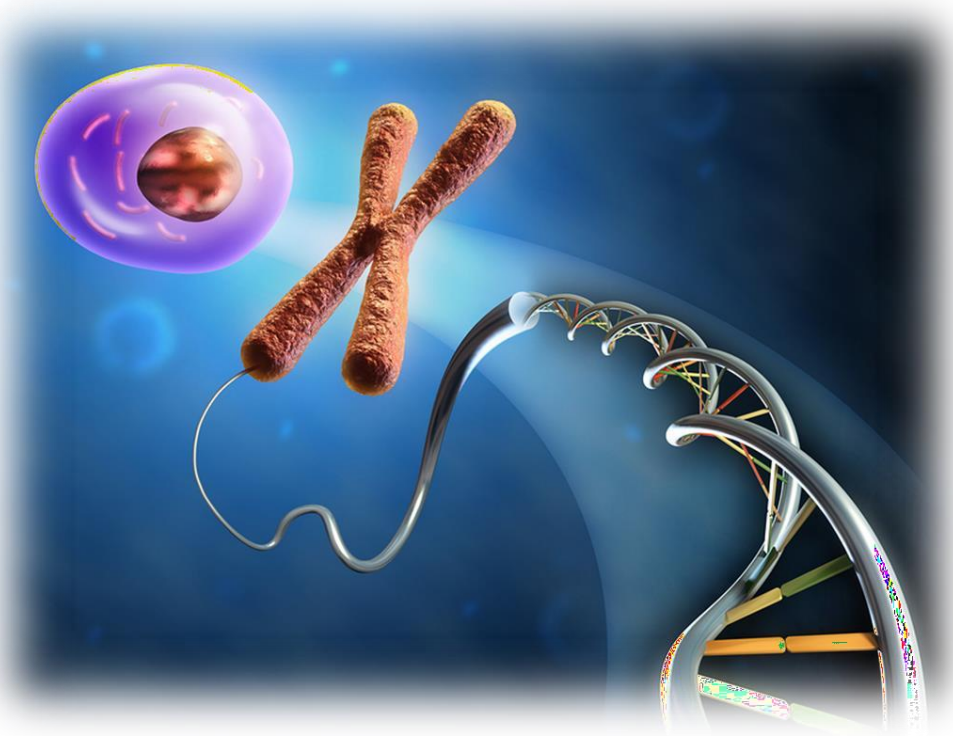
INTRODUCTION

This module has been designed to introduce you to the basics of health sciences. The course covers the molecular level of cell biology including genetics and its role in embryology, microbiology and pathology.

You will also experience clinical skills such as learning to communicate effectively so that you can relate to patients and their loved ones with compassion and understanding in coming years. Through working within teams, your co-operative and approachable working style will be enhanced. Through group and individual work, you will develop problem solving skills to apply your medical knowledge to practical situations. This, supplemented by lectures, and practical classes, is a significant component of the course.

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!!



TOPICS, COURSE OBJECTIVES AND STRATEGIES

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

ANATOMY

OBJECTIVES	TEACHING STRATEGY
GENERAL HISTOLOGY	
1. Explain the concept of organization of cells to tissue, tissues to organ and organs to system	Interactive Lecture
2. Describe the parts of microscope	Practical
3. Describe the structural organization of cell membrane and discuss the function of the components 4. Describe the structure and functions of the following cytoplasmic organelles: i. Golgi apparatus ii. Lysosomes iii. Peroxisomes iv. Smooth endoplasmic reticulum v. Rough endoplasmic reticulum vi. Ribosomes vii. Cellular inclusions viii. Mitochondria ix. Nucleus	Interactive Lecture/Skills
5. Describe the ultra structure and function of the cytoskeleton	Interactive Lecture
6. Describe cell junction complex	
7. Discuss the following basic tissues of the body i) Epithelium ii) Connective tissue iii) Muscle iv) Bones v) Cartilage vi) Neural tissue	
8. Describe the microscopic features of epithelial tissues, explain their functional importance and their surface modification	
9. With use of microscope identify the following: i. Epithelium ii. Connective tissue	Practical
10. Name the basic histological stains 11. Define the following terms: i. Fixation ii. Embedding iii. Sectioning iv. Staining	

12. Describe the microscopic features of connective tissues	Interactive Lecture
13. Differentiate between types of connective tissues: loose connective tissue, Adipose connective tissue, reticular connective tissue, dense connective tissue, regular and irregular	
GENERAL EMBRYOLOGY	
14. Explain the basic terms related to embryology	Small Group Discussion/Interactive lecture
15. Explain cell cycle, division, abnormal cell division and mutations	Interactive Lecture
16. Discuss the significance of karyo typing and its clinical significance	
17. Explain the phases of mitosis & meiosis	
18. Differentiate between the stages of mitosis and meiosis	
19. Justify the importance and results of meiosis in both sexes.	
20. Identify male reproductive organs and their functions	
21. Identify female reproductive organs and their functions	Interactive Lecture/Case-Based Learning
22. Describe the process of spermiogenesis, oogenesis and ovulation	
23. Describe the phases of female reproductive cycles and their disturbance leading to polymenorrhoea, oligomenorrhoea and infertility	
24. Correlate the cyclic changes occurring in the ovary with that of uterus with their endocrine control	Interactive Lecture
25. Describe the phases of fertilization	
26. Discuss the results of fertilization	
27. Discuss artificial reproductive techniques and Describe the steps involved during in vitro fertilization and embryo transfer	Small Group Discussion
28. Describe cleavage and blastocyst formation	Interactive Lecture
29. Discuss the results of implantation at abnormal site	Interactive Lecture / Case-Based Learning
30. Describe the events of the second week of development including Formation of amniotic cavity, amnion, bilaminar embryonic disc, yolk sac, chorionic sac and primary chorionic villi	Interactive Lecture
31. Describe the following events of the third week of development <ul style="list-style-type: none"> i. Formation of primitive streak and notochord ii. Gastrulation iii. Formation of neural tube iv. Formation of somites v. Formation of intra embryonic coelom vi. Formation of blood cells and blood vessels vii. Formation of secondary and tertiary chorionic villi 	

32. Describe folding of embryo and its results	Interactive lecture
33. Discuss the derivatives of germ layers and neural crest cells	
34. Describe the structure, development and functions of placenta and fetal membranes	
35. Explain the developmental process during first three weeks of gestation	Interactive Lecture/ Small Group Discussion /Tutorial
36. Discuss the important events of embryonic period from 4th week to 8th week and during the organo-genetic period	Interactive lecture
37. Discuss the events of fetal period	
38. Describe the types of twin / multiple pregnancies	Interactive Lecture / Small Group Discussion / Case- Based Learning
39. Define teratogenesis. 40. Classify the teratogens. 41. Describe the basic principles of teratogenesis	Interactive lecture
42. Discuss the common congenital anomalies	Case-Based Learning/Interactive lecture
43. Calculate the expected date of delivery (EDD) and describe various methods used to assess fetal wellbeing	Small Group Discussion /Tutorial
44. Identify the placenta, fetal membranes, umbilical cord, germ layers, stages of fertilization on a given model, photograph or specimen	Practical/Tutorial
GENERAL ANATOMY	
Introduction to Anatomy 45. Define anatomy, differentiate between its branches and state their practical application in different fields of medicine. Levels of Organization of human body 46. Conceptualize the integration of structures and function in human body by relating with the arrangement of different levels of organization.	Interactive Lecture
Anatomical Terminologies: Position and Planes 47. Identify location of the dissected/prosected parts/organs of human body with respect to various terms of position, direction and planes of body Terms of movement 48. Define the movements occurring at various joints of body (flexion, extension, abduction, adduction, rotation) 49. Identify movements occurring at specific joints (pronation, supination, inversion, eversion) 50. Identify the planes at which the movements occur	Small Group Discussion /Tutorial

<p>Introduction to Skeletal system (Bones and Joints)</p> <p>51. Describe the parts of appendicular and axial skeleton</p> <p>52. Discuss the functions of bone</p> <p>53. Classify bones on the basis of shape, development, region and structure.</p> <p>54. Distinguish between intramembranous and endochondral ossification.</p> <p>55. List the parts of young & adult bone</p> <p>56. Explain the blood supply of long bones</p> <p>57. Classify joint on the basis of structure, regions and functions.</p> <p>58. Discuss the characteristics of synovial joints</p> <p>59. Classify synovial joints on the basis of structure and movement</p> <p>60. Define dislocation, sprain and inflammation of joints</p>	
<p>Introduction to Muscular System:</p> <p>61. Classify the muscles according to their shape (architecture), direction of fibres and their actions</p> <p>62. Explain the principles of innervation and blood supply of muscles</p>	Interactive Lecture
<p>Introduction to Nervous System:</p> <p>63. Discuss the general organization of nervous system and its basic divisions.</p> <p>64. Define the various components of CNS and PNS</p> <p>65. Describe the structure and types of Neuron</p> <p>66. Define a nerve and its coverings</p> <p>67. List various types of Neuroglia and state their functions</p> <p>Typical Spinal Nerve</p> <p>68. Define a spinal nerve, its distributions and various components</p> <p>69. Identify their location and site of emergence</p> <p>70. Identify various components of a typical spinal nerve</p> <p>71. Describe the distribution of gray rami</p>	
<p>Introduction to lymphatic system</p> <p>72. Discuss lymphatic system, lymphatics, lymph nodes and lymphoid organs.</p> <p>73. Describe the structure of lymph nodes</p> <p>74. Identify the role of lymphatics in the spread of cancer</p>	
<p>Integumentary system and its parts, function, appendages and fascia-I</p> <p>75. Define the term integumentary system and its functions</p> <p>76. Differentiate between epidermis & dermis</p> <p>77. Discuss the significance of tension lines</p> <p>78. Identify the appendages of the skin</p> <p>79. Differentiate between superficial & deep fascia</p>	

BIOCHEMISTRY

OBJECTIVES	TEACHING STRATEGY
Introduction to Biochemistry	Interactive lectures
1. Discuss the role, importance and applications of biochemistry in medical practice	
Cell structure function & organelle	
2. Explain the cell organelle with their biochemical function 3. Discuss the biochemical composition of the cell membrane as functional unit	
Water	
4. Discuss the properties of water that account for surface tension, viscosity, and colloids 5. Describe the mechanism of dissociation of water and concept of pH, body Buffers and their mechanism of action	
Carbohydrates	
6. Define & classify Carbohydrates 7. Explain structure, formation (glycosidic bond) & functions of monosaccharide 8. Explain disaccharide, oligosaccharide and their biochemical importance in health and disease 9. Define polysaccharide and their biochemical importance in health and disease	
Lipids	
10. Define and classify Lipids 11. Explain the chemistry, structure and functions of fatty acids 12. Describe properties and biological functions of simple lipids (TAG) & compound lipids (PL) 13. Explain sterols (cholesterol) chemistry, structure and their biochemical importance in health and diseased state 14. Classify Ecosanoids 15. Explain their biomedical importance	
Proteins	
16. Classify Amino Acid on the basis of structure, properties, nutritional significance & their biological role 17. Define peptides, polypeptides and their biomedical importance 18. Classify Protein with their biochemical importance 19. Explain the structure of protein	
Nucleic Acid	
20. Explain the nucleotide chemistry with their biochemical importance. 21. Explain DNA & RNA structure	
Enzymes	
22. Explain Enzymes, mechanism of action and enzyme kinetics (Co-enzymes, Co factors & Inhibitors) 23. Discuss about the classification of enzymes and individual enzyme property 24. Discuss factors inhibiting and promoting enzyme activity 25. Explain the clinical importance of enzymes (Clinical enzymology)	

Vitamins	
26. Define and classify Vitamins 27. Discuss the overall role of vitamins and their importance in normal body functions	
28. Describe the protocols & hazards of Biochemistry Laboratory 29. Detect polysaccharides, Mono & Disaccharides in the lab 30. describe the Scheme & general test for detection of protein in the lab 31. Detect individual proteins in the lab 32. Detect Lipids in the lab	Practicals

PHYSIOLOGY

OBJECTIVES	TEACHING STRATEGY
Extracellular fluid & internal environment	Interactive Lecture/ Tutorial
1. Describe functional organization of human body and fluid compartments	
Homeostasis and control system of body	
2. Recognize the role of physiochemical aspects for the maintenance of homeostasis	
Functional importance of Cell membrane	
3. Explain composition and basic structure of cell membrane its functional importance and adaptation	
Cell organelles 1 & 2	
4. Describe the structure and functions of various cell organelles	
Transport across cell membrane (Passive)	
5. Describe types and process of passive transport across the membrane and their effects 6. Describe diffusion and its physical basis	
Transport across cell membrane (Active)	
7. Describe membrane transport mechanism types and effects	
Cell signaling mechanism	
8. Discuss the chemistry of signals, receptors and importance of lipid and proteins in membranes	
Locomotion and Apoptosis:	
9. Define Apoptosis 10. Describe the process of apoptosis and cell locomotion	
Introduction to Autonomic Nervous System	
11. Define Autonomic Nervous System 12. Describe the function of divisions of ANS and the neurotransmitters involved	
Practical	Practical
13. Introduction to lab	
14. Laboratory manners, equipment handling and Microscope 15. Effects of osmotic variations in ECF on cell	

BIOETHICS /COMMUNICATION SKILLS

OBJECTIVES	TEACHING STRATEGY
1.To Discuss the importance of Ethics in medicine	Interactive Lecture
2.To Discuss the Importance of good Communication skills	Interactive Lecture

STUDY SKILLS

OBJECTIVES	TEACHING STRATEGY
1.Learning Styles	Interactive Lecture/ Small Group Discussion
a. Identify their own learning styles b. Apply effective learning strategies to improve their learning	
2.Test Taking Skills	
a. Demonstrate appropriate test preparation skill b. Analyze test taking strategies of academic high achievers c. Develop repertoire of effective study habits d. Distinguish between effective and ineffective study habits e. Apply strategies to improve reading skills. f. Improve note taking skills during lectures and visual aids.	
3.Time Management Skills	
a. Identify various strategies for reducing time wasters b. Recognize the variety of procrastination c. Apply relevant technique to overcome procrastination d. Create more planning time for achieving priority goals timely	
4.Stress Management	
a. Map the course and effect of stress on one self b. Assess their own stress levels c. Recognize stress management technique	
5.Reflective Practise	
a. Appreciate the benefits of reflection & its place in academic study b. Use reflection to improve their learning	
6.Healthy Lifestyle Changes	
a. Identify healthy study habits to maintain and improve cognitive, social, physical and emotional health.	

LEARNING RESOURCES

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

OTHER LEARNING RESOURCES

<u>Hands-on Activities/ Practical</u>	Students will be involved in Practical sessions and hands-on activities that link with the foundation module to enhance the learning.
<u>Labs</u>	<ul style="list-style-type: none"> Utilize the lab to relate the knowledge to the specimens and models available.
<u>Skill Labs</u>	<ul style="list-style-type: none"> A skills lab provides the simulators to learn the basic skills and procedures. This helps build the confidence to approach the patients.
<u>Videos</u>	Video familiarize the student with the procedures and protocols to assist patients.
<u>Computer Lab/CDs/DVDs/Internet Resources:</u>	To increase the knowledge students should utilize the available internet resources and CDs/DVDs. This will be an additional advantage to increase learning.
<u>Self Learning</u>	Self Learning is scheduled to search for information to solve cases, read through different resources and discuss among the peers and with the faculty to clarify the concepts.

ASSESSMENT METHODS:

- **Best Choice Questions(BCQs)** also known as MCQs (Multiple Choice Questions)

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.

○ **Sample BCQs:**

A 25 year old patient presented with the complain of productive cough, breathlessness and wheezing.

He has been diagnosed with chronic obstructive pulmonary disease.

The most common risk factor for the disease is:

- a) Air pollution
- b) Coal mining
- c) Infection
- d) Tobacco smoke**

OSPE: Objective Structured Practical Examination (See the proposed plan of OSPE)

- It may comprise between 12- 25 stations.
- 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, unobserved, interactive and rest stations.

• **Observed and interactive stations:**

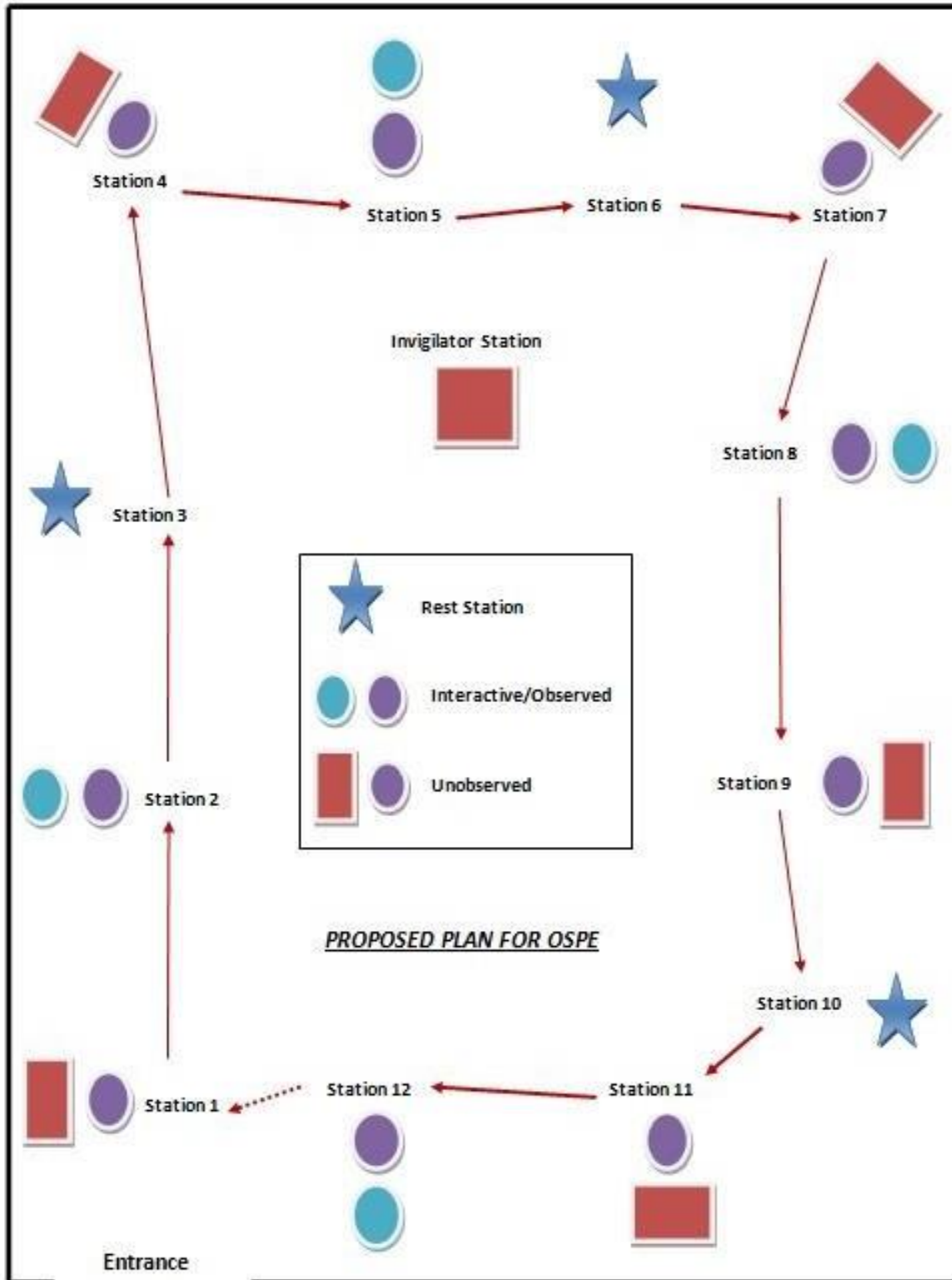
They will be assessed by internal or external examiners through the task or viva.

• **Unobserved station:**

It will be static station in which students will have to answer the questions related to the given pictures, models or specimens on the provided response sheet.

• **Rest station:**

It is a station where no task is given, and during this time student can organize his/her thoughts.



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	1ST YEAR	MONTH
WEEK 1	FOUNDATION MODULE	3rd Feb 2020
WEEK 2		13th March 2020
WEEK 3		
WEEK 4		
WEEK 5		
WEEK 6		
WEEK 1	BLOOD MODULE	March 2020*
WEEK 2		May 2020*
WEEK 3		
WEEK 4		
WEEK 5		
WEEK 6		
WEEK 7		
WEEK 8		
	PREPARATORY LEAVE*	
	MID TERM EXAM*	

*Final dates will be announced later