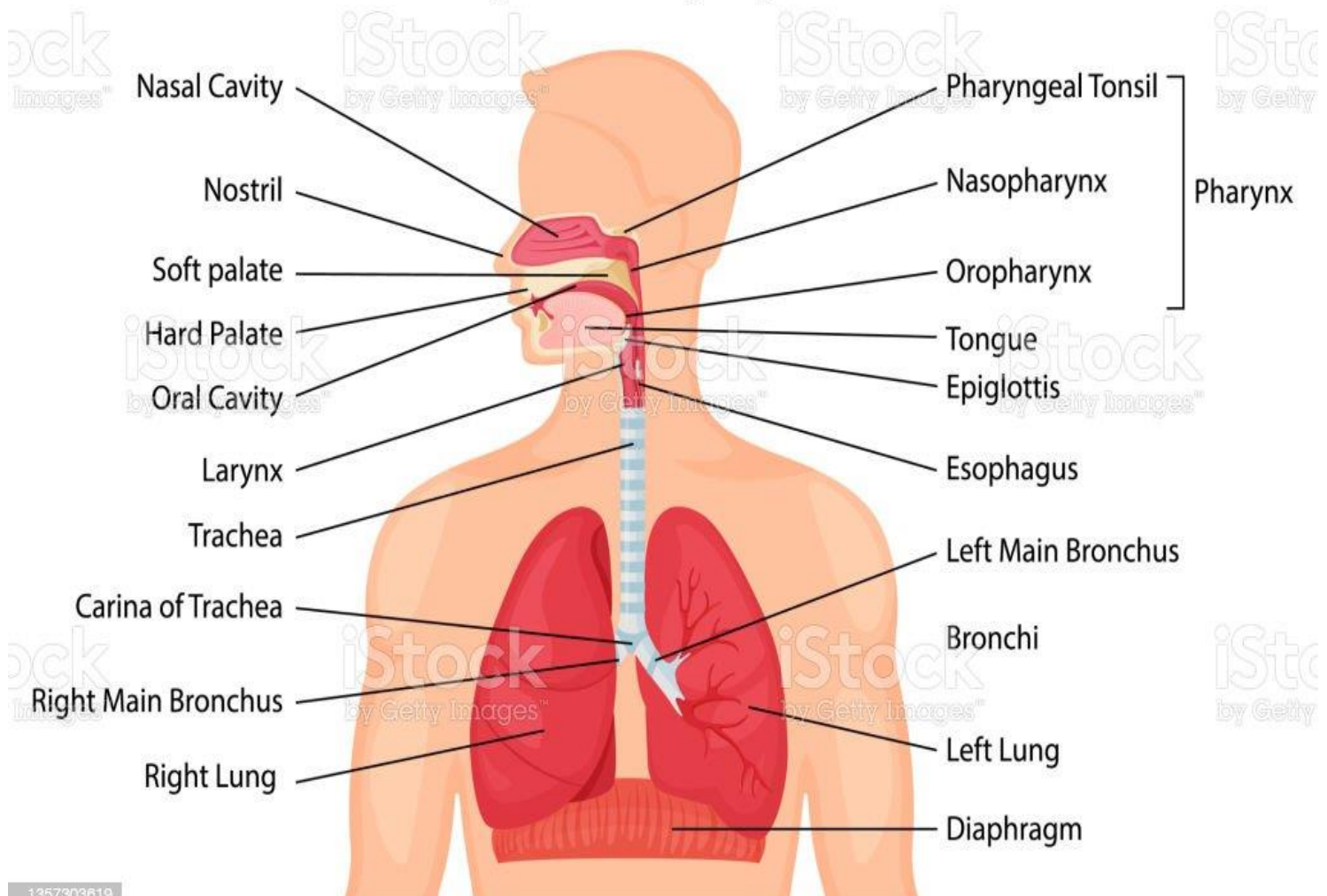




RESPIRATORY MODULE I

10TH JULY 2023 TO 5TH AUGUST 2023

Respiratory system



STUDY GUIDE FOR RESPIRATORY SYSTEM-I MODULE

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Module name: Respiratory System I

Year: one

Duration: 4 weeks (July-2023)

Timetable hours: Lectures, Case-Based Learning (CBL), Laboratory, Practical, Demonstrations, Skills, Self- Directed Learning, Flipped Classroom

MODULE INTEGRATED COMMITTEE

MODULE COORDINATOR	Prof. Ahsan Ashfaq (Physiology)
CO-COORDINATOR	Dr. Fatima Rehman (Anatomy)

DEPARTMENTS & RESOURCE PERSONS' FACILITATING LEARNING

BASIC HEALTH SCIENCES		
ANATOMY Professor Zia-ul-Islam		
BIOCHEMISTRY Professor Faiza Agha		
PHYSIOLOGY Professor Syed Hafeezul Hassan		
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STUDY GUIDE COMPILED BY: Department of Health Professions Education		

INTRODUCTION

WHAT IS A STUDY GUIDE?

It is an aid to:

Inform students how the student learning program of the 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 the 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 Interactive Lectures, small group teachings, clinical skills, demonstrations, tutorials, 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, and journals, for students to consult to maximize their learning.
- Highlights information on continuous and module examinations' contribution to 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 about examination policy, rules, and regulations.

CURRICULUM FRAMEWORK

Students will experience an integrated curriculum similar to previous modules.

INTEGRATED CURRICULUM comprises system-based modules such as Foundation II, Blood II, Locomotor II, Respiratory system-II, CVS-II, and GIT Liver II, linking basic science knowledge to clinical problems. Integrated teaching means that subjects are presented as a meaningful whole. Students will be able to have a better understanding of basic sciences when they repeatedly learn about clinical examples.

LEARNING EXPERIENCES: Case-based integrated discussions, and skills acquisition in the skills lab. Computer-based assignments, and learning experiences in clinics, wards, and outreach centers.

LEARNING METHODOLOGIES

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

- Interactive Lectures
- Tutorial
- Case- Based Learning (CBL)
- Clinical Experiences
 - Clinical Rotations
- Skills session
- Self-Directed Learning

INTERACTIVE LECTURES:

In a large group, the Interactive Lectures introduce a topic or common clinical conditions and explain the underlying phenomena through questions, pictures, videos of patient interviews, exercises, etc. Students are actively involved in the learning process

TUTORIAL: This format helps students to clarify concepts, and acquire skills or desired attitudes. Sessions are structured with the help of specific exercises such as patient cases, interviews, or discussion topics. Students exchange opinions and apply knowledge gained from Interactive Lectures, tutorials, and self-study. The facilitator's role is to ask probing questions, summarize, or rephrase to help clarify concepts.

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 constructing new knowledge. The CBL will be provided by the concerned department.

CLINICAL LEARNING EXPERIENCES: In small groups, students observe patients with signs and symptoms in hospital wards, clinics, and outreach centers. This helps students relate knowledge of the module's basic and clinical sciences and prepare for future practice.

CLINICAL ROTATIONS: In small groups, students rotate in different wards like Medicine, Pediatrics, Surgery, Obs & Gyne, ENT, Eye, Family Medicine clinics, outreach centers &

Community Medicine Experiences. Here students observe patients, take histories and perform supervised clinical examinations in outpatient and inpatient settings. They also get an opportunity to observe medical personnel working as a team. These rotations help students relate basic medical and clinical knowledge in diverse clinical areas.

SKILLS SESSION: Skills relevant to the respective module are observed and practiced where applicable in the skills laboratory.

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

MODULE: RESPIRATORY SYSTEM

IMPORTANCE OF RETHE RESPIRATORY SYSTEM

The module focuses on integrating basic health sciences into clinical medicine. It will be taught in a combination of lectures, tutorials, small group learning sessions, practical and skills classes, and possibly visits to clinics/wards. The module will explore the normal as well as the abnormal physiology of the respiratory system. Students will be introduced to a variety of pathologies to facilitate a better understanding of how the respiratory system is impacted by the disease. It will be a broad overview of the system. The module will also address respiratory adaptations to exercise as well as examine its responses to different environments like high altitudes and deep sea diving. This will extend students' integrative abilities.

AIMS OF THIS MODULE:

The module aims to provide:

- Knowledge and understanding of the structures and functions of the respiratory system and how it responds to changing metabolic needs of the body, organs, and tissues, revealing the relevance of such knowledge to clinical practice
- Knowledge and understanding of the origin and associated risk factors of common diseases of the respiratory system
- Knowledge and prevention of common infectious diseases associated with the respiratory diseases
- Practice of basic skills used in testing the function of this system in a simulated clinical setting

COURSE OBJECTIVES AND TEACHING STRATEGIES

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

ANATOMY

OBJECTIVES	LEARNING STRATEGY
1. Introduction to thoracic cage, thoracic inlet, and gross anatomy of the diaphragm	Interactive Lecture
• Describe the thoracic cage and its boundaries	
• Describe the thoracic Inlet and thoracic outlet	
• Discuss intercostal muscles and their neuro-vasculature	
• Describe supra-pleural membrane and endo-thoracic fascia	
• Describe the position & component of muscular & tendinous part of diaphragm	
• Describe the attachments of the diaphragm	
• Describe the blood supply and nerve supply of the diaphragm	
• Describe the opening present in the diaphragm and their respective levels	
• Enumerate the structures passing through the openings and piercing the diaphragm	
• List the functions of the diaphragm	Tutorial
2. Thoracic vertebrae & joints of the thoracic wall	
• Describe the general features of the vertebral column	
• Describe spinal curvature in children and adults	
• Discuss the general characteristics of a vertebra and general features of thoracic vertebrae	
• Differentiate typical and atypical vertebrae	
• Discuss joints formed by thoracic vertebrae, general features of intervertebral joints, and cost of vertebral joints	
• Enumerate the diseases related to the vertebral column (scoliosis, lordosis, disc prolapse)	
• Describe the features of diseases related to thoracic vertebrae	Interactive Lecture
3. Thoracic wall muscles & fascia of thoracic wall & movements	
• Describe the layers of the thoracic wall	
• Describe the attachment of muscles of the thoracic wall, their actions & nerve supply	
• Describe the arrangement & modifications of fascia	
4. Neurovascular supply of thoracic wall	
• Describe the nerve supply of skin, fascia, and muscles of the thoracic wall	
• Describe the origin and course of arteries, and nerves supplying the thoracic wall	
• Explain the venous drainage of the thoracic wall and its communications	Interactive Lecture
5. Mediastinum, its divisions, and contents of the superior and anterior mediastinum	
• Define mediastinum	
• Describe the divisions of the mediastinum	
• Define the extent and boundaries of the mediastinum	
• Describe the boundaries of the superior mediastinum	
• List the contents of the superior mediastinum	

<ul style="list-style-type: none"> • Describe the origin, extent, and, termination of the aorta • Describe the extent, branches, and relations of the Aorta within the superior mediastinum • Explain the tributaries of superior vena cava within the superior mediastinum • Discuss the nerves present in the superior mediastinum • Describe the major viscera present in the superior mediastinum • Describe the boundaries and contents of the anterior mediastinum 	
<p>6. Posterior Mediastinum-I (Thoracic Aorta, Esophagus & Azygous System of vein)</p> <ul style="list-style-type: none"> • Describe the boundaries of the posterior mediastinum • List the contents of the posterior mediastinum • Describe the extent and position of the thoracic aorta in the posterior mediastinum • Enumerate the branches of the thoracic aorta • Describe the length, extent, and relations of the esophagus • Describe the blood supply, nerve supply, venous drainage, & lymphatics of the esophagus • Discuss the clinical significance of anatomical constrictions of the esophagus • Define Azygos system of veins • Describe the formation, course, relations, and tributaries of the azygos, Hemi-azygos & Accessory hemi-azygos veins • Discuss variations in the origin of the azygos vein • Discuss the clinical importance of the Azygos system of veins 	Interactive Lecture
<p>7. Posterior mediastinum-II (Thoracic sympathetic trunk, thoracic duct, phrenic and vagus nerve)</p> <ul style="list-style-type: none"> • Discuss the thoracic part the of sympathetic chain, ganglia, and branches • Describe the origin, intrathoracic course, and branches of vagus & phrenic nerves • Describe the origin, extent, tributaries, territory of drainage & termination of the thoracic duct 	
<p>8. Introduction to the respiratory tract (Gross anatomy of pleura and lung)</p> <ul style="list-style-type: none"> • Enumerate the parts of the respiratory tract • Describe the clinical (upper and lower respiratory tract) and anatomical (Conducting and respiratory) divisions of respiratory tracts • Describe parietal and visceral pleura anthers innervation • Describe the arrangement of pleura according to lines of orientation (mid sternal, midclavicular and axillary, etc) • Discuss clinical anatomy of the pleura (related to effusion and pleural tap etc) • Name the diseases related to pleura • Summarize the features of diseases related to pleura 	Interactive Lecture
<p>9. Vasculature of lungs, bronchial & pulmonary vessels, & lymphatics of the thorax</p> <ul style="list-style-type: none"> • Describe the origin, course, and termination of bronchial vessels and their territory of supply/ drainage • Discuss the origin, course, and termination of pulmonary vessels and their functions • Describe the nerve supply of the lung • Describe the different groups of lymph nodes in the thorax • Discuss the deep as well as the superficial lymphatics of the thorax • Discuss the significance of lymphatics drainage of the thorax 	
<p>10. Histology of respiratory epithelium and its variations</p> <ul style="list-style-type: none"> • Name the types of epithelia lining the various parts of the respiratory system • Explain the histological features of various parts of the respiratory system 	

11. Histology of trachea and lung	
• Describe the histological features of different layers of the trachea	
• Describe the divisions of the bronchial tree	
• Discuss the structural variations in different parts of the bronchial tree	
• Describe the structure of alveoli and interalveolar septum	
• Relate the functions of different types of cells, forming the alveolar wall	
• Describe the structure and function of the blood –the air barrier	
12. Development of body cavities and diaphragm, and their anomalies	
• Define the intra-embryonic mesoderm and its parts	
• Discuss the divisions of lateral plate mesoderm into visceral and parietal layers enclosing intraembryonic coelom	
• Describe the Cephalo-caudal and transverse folding of the embryonic disc	
• Specify the extent of intraembryonic coelom after folding and its divisions into three serous cavities	
• Discuss the formation of Pleuro-pericardial and Pleuro-peritoneal membranes	
• Define embryonic components of the diaphragm (Septum Trans-verse etc)	
• Discuss the steps of development of the diaphragm from its composite embryonic derivatives	
• Discuss anomalies related to its development	
13. Development of the respiratory system and its anomalies	
• Discuss the formation of Laryngo- the tracheal groove & respiratory diverticulum or Lung Bud	
• Describe the branching of primitive bronchi	
• Discuss the stages of development/maturation of Lungs	
• Name the congenital anomalies of the respiratory system (tracheoesophageal fistula etc)	
• Describe the main features of the common congenital anomalies	
14. Cross-sectional anatomy of the thorax	
• Explain Thorax cross-sectional anatomy	
• Identify mediastinal great vessels, organs, and lymph nodes on cross-sectional images at different levels	
• Identify the structures at the T4 vertebral level or angle of Louis	
15. Sternum & Ribs [muscle attachment, typical and atypical ribs] (Demonstration)	
• Describe the borders and surfaces of the sternum	
• Summarize the locations of the muscles attached to the sternum	
• Enumerate the type of joints formed at the sternum	
• Relate the type of joint with its functions (clinical significance)	
• Classify ribs	
• Discuss the features of ribs	
• Differentiate typical from atypical ribs	
• Describe the attachments (muscles and ligaments) on ribs	
• Discuss joints formed by the ribs	
• Describe the clinical features of cervical rib and rib fracture	
• Describe the functional significance of the sternum	
16. Gross anatomy of the lung (Demonstration)	
• Describe the apex, base, surfaces, and borders of the lungs	
• Describe Hilum /root of the lungs	
	Tutorial

• Discuss Fissures and lobes of the lungs	
• Describe the divisions of the bronchial tree	
• Describe the bronchopulmonary segmentation and their importance	
17. Surface anatomy of thoracic wall, lungs & pleura (Demonstration)	
• Describe the surface marking of ribs and intercostal spaces	
• Mark the anatomical landmarks of important thoracic arteries and veins	
• Identify the surface anatomy of the trachea and main bronchi	
• Identify the important anatomical landmarks of the lungs	
• Mark the surface anatomy of the pleura	
18. Respiratory epithelium and its variations	
• Identify the various epithelial tissue and its variations in different parts of conducting system, as shown in the slides of the respiratory tract	
19. Histology of trachea and lung	
• Describe the histological characteristics of different layers of the trachea based on light microscope findings	
• Identify different components of the bronchial tree	
• Identify alveolar duct, alveolar sac and alveoli	

BIOCHEMISTRY

OBJECTIVES	LEARNING STRATEGY
1. Phospholipids	Interactive Lecture/Tutorial
• Classify the Phospholipids in the human body with examples	
• Discuss the synthesis and degradation of phospholipids	
• Discuss the functions of phospholipids in the human body	
• Describe the synthesis and biochemical role of surfactant	
• Discuss the clinical significance of Acute Respiratory Distress Syndrome	Interactive Lecture/SDL
2. Regulation acid-base balance	
• Explain the mechanism of acid production	
• List the volatile & non-volatile acids	
• Describe Henderson's Hassellbach equation	
• Explain the mechanisms of buffer in the human body	
• Discuss the normal regulation of pH by buffers, respiratory and renal systems	
• Explain the anion gap and its biochemical significance	
• Interpret the values of Arterial Blood Gases (ABGs)	
3. Respiratory pH disturbances	
• Explain the role of respiration in pH regulation	
• Explain the mechanism of pH regulations in respiratory disturbances	
• Explain how to analyze ABGs in respiratory disorders	
• Discuss the clinical disorder of respiratory pH disturbances and their ABGs	

4. Respiratory compensation mechanism	
• Describe the compensation of pH disturbances by the respiratory system	
• Describe compensation of pH disturbances due to respiratory diseases	
• Describe respiratory acidosis and respiratory alkalosis	
• Interpret the respective ABGs in various clinical disorders	
5. Arterial Blood Gases (ABGs)	
• Interpret the normal values of Arterial Blood Gases (ABGs)	Tutorial
• Interpret the ABGs in various clinical disorders	
• Discuss the ABGs in compensated Acid based Disorders	
6. pH meter	
• Identify the chemical tests and bio-techniques to detect the pH of solutions	Practical
• Outline the methods for the detection of the pH of solutions in a sample	
• Determine the pH of different solutions using a pH meter and litmus paper	
• Correlate the laboratory investigations with relevant clinical conditions	

PHYSIOLOGY

OBJECTIVES	LEARNING STRATEGY
1. Introduction to Respiratory Physiology	Interactive Lecture
• List parts of the upper and lower respiratory tract	
• Describe the functions of respiratory passages	
2. Mechanics of Respiration	
• Explain the mechanism of pulmonary ventilation concerning the thoracic cage & muscles of respiration	
• Define alveolar pressure, pleural pressure, and alveolar ventilation	
• Discuss trans-pulmonary pressure and its changes during respiration	
• Define dead space	
3. Lung Compliance	
• Define lung compliance	
• List factors affecting lung compliance	
• Describe the role of surfactant in maintaining lung compliance	
• Differentiate compliance work, tissue resistance work & airway resistance work	
4. Pulmonary volumes and capacities	
• List the pulmonary volumes & capacity with their normal values & significance in pulmonary function test	
• Determine functional residual capacity, residual vol. & total lung capacity (helium dilution method)	
5. Pulmonary circulation V/Q relationship	Interactive Lecture
• Describe pressure in pulmonary circulation & blood flow zones of lung (1,2,3)	
• Explain pulmonary capillary dynamics	
• Explain the mechanism of the development of pulmonary edema	
• State the importance of the ventilation/perfusion ratio	

6. Diffusion of gases	Interactive Lecture
<ul style="list-style-type: none"> • Define respiration unit & respiration membrane 	
<ul style="list-style-type: none"> • Describe the mechanics of diffusion across the respiration membrane & facts affecting diffusion 	
<ul style="list-style-type: none"> • List partial pressure of respiratory gases in the atmosphere, humidified, alveolar & expired air • Describe briefly the diffusing capacity of O₂ and CO₂ 	
7. Transport of Carbon dioxide (CO₂)	Interactive Lecture
<ul style="list-style-type: none"> • Describe the chloride shift 	
<ul style="list-style-type: none"> • Relate effect of CO₂ and O₂ transport (Haldane effect) • Define respiratory exchange ratio 	
8. Oxygen (O₂) transport and O₂-Hb curve	Interactive Lecture
<ul style="list-style-type: none"> • Explain the transport of O₂ from lungs to body tissues 	
<ul style="list-style-type: none"> • Describe briefly the role of Hb in O₂ transport • Define the Bohr effect 	
9. Respiratory adjustments to exercise	Interactive Lecture
<ul style="list-style-type: none"> • Describe the effects of exercise on the respiratory system 	
10. Respiratory adjustments to high altitude & deep sea	
<ul style="list-style-type: none"> • Explain the physiology of acclimatization and deep-sea diving 	
11. Hypoxia and its types	
<ul style="list-style-type: none"> • Define hypoxia and its types • Describe coughing & sneezing reflexes 	
12. Regulation of respiration	
<ul style="list-style-type: none"> • List the respiratory centers & their effect on the regulation of respiration • Describe the neural and chemical control of respiration 	
13. Pulmonary causes of Dyspnea	
<ul style="list-style-type: none"> • Describe the Pulmonary causes of Dyspnea: Emphysema, Pneumonia, Atelectasis, and Tuberculosis 	
14. Introduction to Power Lab	Practical
<ul style="list-style-type: none"> • Identify different parts of the power lab concerning respiration and recording of normal respiratory rate 	
15. Lung volume and capacities	
<ul style="list-style-type: none"> • Determine lung volumes and capacities (Spirogram) 	
16. Pulmonary Function Tests (spirometry)	
<ul style="list-style-type: none"> • Perform respiratory function tests • Interpret results of respiratory function tests 	

LEARNING RESOURCES

SUBJECT	RESOURCES
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 Indu Khurana 4. Short Textbook Of Physiology by Arthur 5. NMS Physiology

ASSESSMENT METHODS:

- MCQs (Multiple Choice Questions)
- **Objective Structured Practical/Clinical Examination (OSPE or OSCE)**
- MCQs and unobserved OSPE will be conducted on the LNH&MC Moodle platform
- Observed OSPE will constitute multiple examiner-based stations

Internal Evaluation

- Students will be assessed comprehensively through multiple methods.
- 20% marks of internal evaluation will be added to JSMU final exam. That 20% includes mid-module & end of module examinations, mid-term & pre-professional examinations.

Formative Assessment

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

For JSMU Examination Policy, please consult the JSMU website!

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



LNMC EXAMINATION RULES & REGULATIONS

- Students must report to the examination hall/venue, 30 minutes before the exam.
- **The exam will begin sharply at the given time.**
- No student will be allowed to enter the examination hall after 15 minutes of the scheduled examination time.
- Students must sit according to their roll numbers mentioned on the seats.
- **Cell phones are strictly not allowed in the examination hall.**
- If any student is found with a cell phone in any mode (silent, switched off, or on) he/she will not be allowed to continue their exam.
- No students will be allowed to sit in exams without University Admit Card, LNMC College ID Card, and Lab Coat.
- Students 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 ST YEAR	MONTH
WEEK 4	RESPIRATORY MODULE	10 th July 2023
		5 th Aug 2023
		7 th Augu2023
WEEK 5	CVS MODULE	9 th Sep 2023
PRE PROF EXAM*		

*Final dates will be announced later