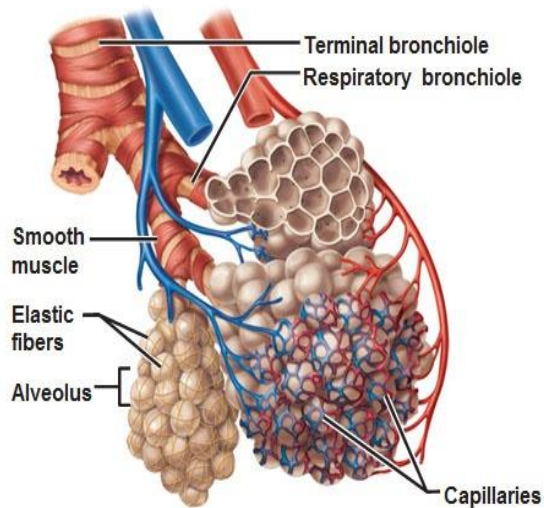


Diagrammatic view of capillary-alveoli relationships

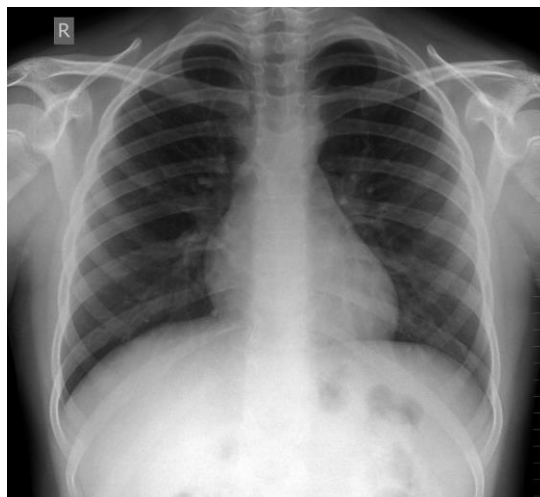
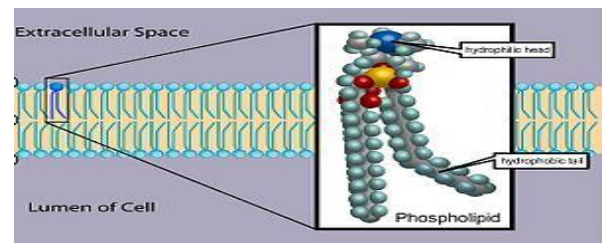


STUDY GUIDE

RESPIRATORY SYSTEM-I MODULE

FIRST YEAR MBBS

30TH MAY- 19TH JUNE 2020
Duration: 4 weeks



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



STUDY GUIDE FOR RESPIRATORY SYSTEM-I MODULE

S. No	CONTENT	Page No
1	Overview	03
2	Introduction to Study Guide	04
3	Learning Methodologies	05
4	Module: Respiratory System-I	07
5	Importance	07
6	Objectives and Strategies	08
6.1	Learning Resources	15
6.2	Assessment Methods	17
7	LNMC Examination Rules and Regulations	18
8	Schedule	19

Module name: Respiratory System I

Year: one

Duration: 4 weeks (May-June 2020)

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

MODULE INTEGRATED COMMITTEE

MODULE COORDINATOR:	<ul style="list-style-type: none"> Dr. Ahsan Ashfaq (Physiology)
CO-COORDINATOR:	<ul style="list-style-type: none"> Dr. Rabia Ali (Pathology)

DEPARTMENTS & RESOURCE PERSONS

BASIC HEALTH SCIENCES		
ANATOMY <ul style="list-style-type: none"> Professor Zia-ul-Islam 		
BIOCHEMISTRY <ul style="list-style-type: none"> Dr. Kashif Nisar 		
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. Mehnaz Umair 	<ul style="list-style-type: none"> Dr. Sobia Ali Dr. Muhammad Suleman 	<ul style="list-style-type: none"> Dr. Afifa Tabassum
LNH&MC MANAGEMENT <ul style="list-style-type: none"> Professor Karimullah Makki, Principal LNH&MC Dr. Shaheena Akbani, Director A.A & R.T LNH&MC 		
STUDY GUIDE COMPILED BY: Department of Health Professions Education		

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:

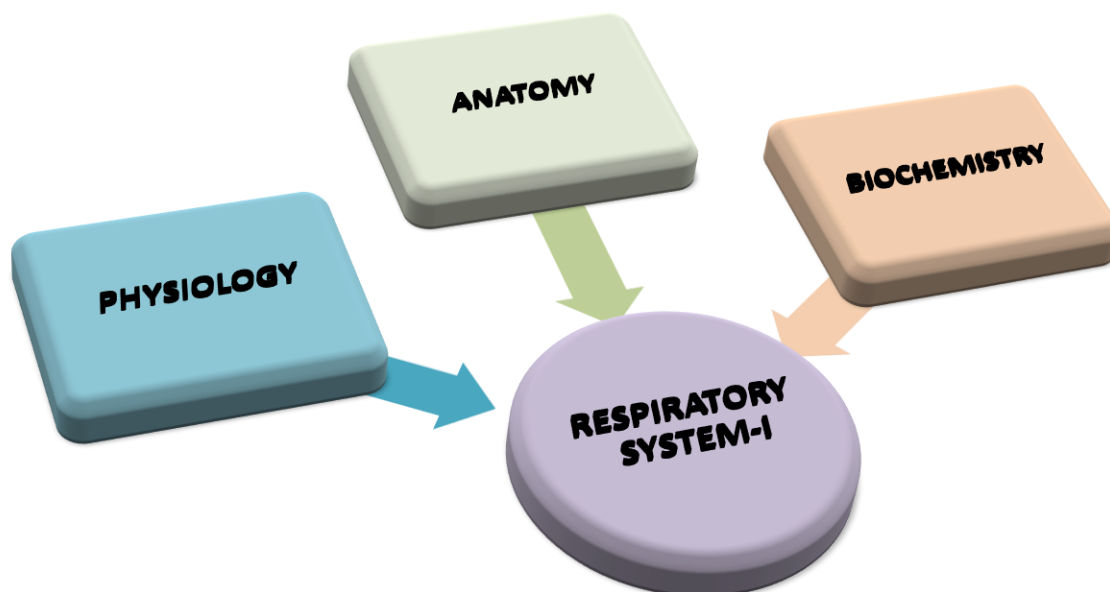
- Communicates information on organization and management of the module
This will help the student to contact the right person in case of any difficulty
- Defines the objectives which are expected to be achieved at the end of the module
- Identifies the learning strategies such as lectures, small group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

INTEGRATED CURRICULUM comprises of system-based modules such as Locomotor system, Respiratory System and Cardiovascular system 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 RESPIRATORY SYSTEM-I MODULE



LEARNING METHODOLOGIES

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

- Interactive Lectures
- Small Group Discussion
- Case- Based Discussion (CBD)
- Clinical Experiences
 - Clinical Rotations
- Skills session

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.

HOSPITAL 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 SESSION (SGS): 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, pathology, pharmacology 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 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.

MODULE: RESPIRATORY SYSTEM-I**IMPORTANCE OF RESPIRATORY SYSTEM**

The module focuses on integrating basic health sciences to 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 disease. It will give the broad overview of the system. The module will also address respiratory adaptations to exercise as well as examining 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	TEACHING STRATEGY
Introduction to thoracic cage, thoracic inlet, and gross anatomy of diaphragm	
1. List the functions of diaphragm	Interactive Lectures
2. Describe the position & component of muscular & tendinous part of diaphragm	
3. Describe the thoracic cage and its boundaries, thoracic Inlet and outlet	
4. Describe the attachments of diaphragm along with its blood supply and nerve supply	
5. Describe the openings present in the diaphragm and their respective levels	
6. Enumerate the structures passing through the openings and piercing the diaphragm	
7. Enumerate the conditions related to damage to Phrenic Nerve	
8. Describe the main features of these condition	
9. Describe the location, shape, and parts of Sternum	
Sternum + General Features of Ribs, muscle attachment and typical and atypical ribs	
10. Summarize the locations of the muscles attached on sternum	Interactive Lectures
11. Enumerate the type of joints formed at sternum	
12. Relate the type of joint with its functions	
13. Describe the functional significance of sternum (clinical significance)	
14. Classify ribs	
15. Discuss the features of ribs	
16. Differentiate typical from atypical ribs.	
17. Describe the attachments (muscles and ligaments) on ribs	
18. Discuss joints formed by the ribs	
19. Describe the clinical features in conditions of cervical rib and rib fracture	
Thoracic vertebrae & joints of thoracic wall	
20. Describe general feature of vertebral column	Interactive Lectures
21. Describe Spinal Curvature in children and adults	
22. Discuss general characteristics of a vertebra	
23. Describe general features of thoracic vertebrae	
24. Differentiate typical and atypical vertebrae	
25. Discuss joints formed by thoracic vertebrae	
26. Enumerate the diseases related to vertebral column (Scoliosis, Lordosis, Disc Prolapse)	
27. Describe the features of diseases related to thoracic vertebrae	
28. General features of inter-vertebral joints	
29. General features of costo-vertebral joints	

Thoracic wall muscles & fascia of thoracic wall & movements	
30. Describe different layers of thoracic wall	Interactive Lectures
31. Describe the attachment of different muscles of thoracic wall with their action & nerve supply	
32. Describe the arrangement & modifications of fascia	
Neurovascular supply of thoracic wall	
33. Describe the nerve supply of skin, fascia and muscles of thoracic wall	Interactive Lectures
34. Describe the origin and course of nerves supplying the thoracic wall	
35. Describe the origin and course of arteries supplying the thoracic wall	
36. Describe the venous drainage of thoracic wall, and its communications	
Mediastinum, its divisions and contents of superior and anterior mediastinum	
37. Define mediastinum	Interactive Lectures
38. Describe the divisions of mediastinum	
39. Define the extent and boundaries of mediastinum	
40. Describe the boundaries of superior mediastinum	
41. List the contents of superior mediastinum	
42. Describe origin, extent and termination of aorta	
43. Describe part of aorta, its branches and relations within in the superior mediastinum	
44. Describe the tributaries of superior vena cava within superior mediastinum	
45. Discuss the nerves within superior mediastinum	
46. Describe the major viscera present in superior mediastinum	
47. Describe the contents of anterior mediastinum	
Posterior mediastinum and its contents (Thoracic Aorta, Esophagus & Azygous System of vein)	
48. Describe the boundaries of Posterior Mediastinum	Interactive Lectures
49. List the contents of Posterior Mediastinum	
50. Describe the extent and position of thoracic aorta in posterior mediastinum	
51. Enumerate the branches of thoracic aorta	
52. Describe the length, extent and relations of esophagus	
53. Describe the blood supply, nerve supply, venous drainage and lymphatics of esophagus	
54. Discuss the clinical significance of anatomical constrictions of esophagus.	
55. Define Azygos system of veins	
56. Describe the formation, course, relations and tributaries of azygos, Hemi-azygos& Accessory Hemi-Azygos veins.	
57. Discuss variations in the origin of Azygos vein	
58. Discuss the clinical importance of Azygos system of veins	

Posterior mediastinum: Thoracic sympathetic trunk, thoracic duct, Phrenic and Vagus nerve	
59. Discuss the thoracic part of sympathetic chain, ganglia, and branches	Interactive Lectures
60. Describe the origin, Intrathoracic course and branches of Vagus& Phrenic nerves	
61. Describe origin, extent, tributaries, territory of drainage and termination of thoracic duct	
Introduction to respiratory tract and gross anatomy of pleura and lung	
62. Enumerate the parts of respiratory tracts	Interactive Lectures
63. Describe the clinical (upper and lower respiratory tract) and anatomical (Conducting and respiratory) divisions of respiratory tracts	
64. Describe parietal and visceral pleura and its innervation	
65. Describe arrangement of pleura according to lines of orientation (mid-sternal, mid Clavicular and Axillary etc)	
66. Clinical related to pleura (effusion and pleural tap etc)	
67. Describe apex , base surfaces and borders of lungs	
68. Describe Hilum / root of the lungs	
69. Discuss Fissures and lobes of the lungs	
70. Describe the divisions of bronchial tree	
71. Describe the bronchopulmonary segmentation and their importance	
72. Name the diseases related to pleura	
73. Outline the features of diseases related to pleura	
Vasculature of lungs, bronchial and pulmonary vessels and lymphatics of thorax	
74. Describe the origin, course and termination of bronchial vessels and their territory of supply / drainage	Interactive Lectures
75. Discuss the origin, course and termination of pulmonary vessels and their functions	
76. Describe the nerve supply of lung	
77. Describe the different groups of lymph nodes in thorax	
78. Discuss the deep as well as the superficial lymphatics of thorax	
79. Discuss the significance of lymphatics drainage of thorax	
Histology of respiratory epithelium and its variations in different parts of conducting system	
80. Structural details of respiratory system	Interactive Lectures
81. Types of epithelia lining the various parts of respiratory system	
82. Histological features of various parts of respiratory system	
Histology of trachea and lung (lecture)	
83. Different layers of larynx	Interactive Lectures
84. Histological characteristics of each layer of larynx	
85. Histological classification of laryngeal cartilage	
86. Structure of trachea and its layer	
87. Different layers of trachea and their histological characteristics	

Histology of trachea and lung (practical)	
88. Describe different layers of larynx on light microscope	Interactive Lectures
89. Histological characteristics of each layer of larynx	
90. Histological classification of laryngeal cartilage	
91. Able to identify structure of trachea and its layer on microscope	
92. Different layers of trachea and their histological characteristics	
Development of body cavities and diaphragm, and their anomalies	
93. Recall the intra embryonic mesoderm and its parts	Interactive Lectures
94. Discuss the divisions of lateral plate mesoderm into visceral and parietal layers enclosing intra-embryonic coelom	
95. Describe the Cephalo-caudal and transverse folding of embryonic disc	
96. Specify the extent of intra-embryonic coelom after folding and its divisions into three serous cavities	
97. Discuss the formation of Pleuro-pericardial and Pleuro-peritoneal membranes	
98. Define embryonic components of diaphragm (Septum Trans-versum etc.)	
99. Discuss the steps of development of diaphragm from its composite embryonic derivatives	
100. Discuss anomalies related to development	
Development of respiratory system and its anomalies	
101. Discuss the formation of Laryngo- tracheal groove & respiratory diverticulum or Lung Bud	Interactive Lectures
102. Describe the branching of primitive bronchi	
103. Discuss the stages of development / maturation of Lungs	
104. Name the congenital anomalies of respiratory system (trachea-esophageal fistula etc.)	
105. Describe the main features of the common congenital anomalies	
Surface anatomy of thoracic wall, lung & pleura	
106. Describe surface marking of ribs and intercostal spaces	Interactive Lectures
107. Mark the anatomical landmarks of important thoracic arteries and veins.	
108. Identify the surface anatomy of trachea and main bronchi	
109. Identify the important anatomical landmarks of lungs	
110. Mark the surface anatomy of pleura	
Cross sectional anatomy of thorax	
111. Explain Thorax cross sectional anatomy	Interactive Lectures
112. Identify mediastinal great vessels, organs and lymph nodes on cross sectional images at different levels	
113. Identify the structural change at T4 vertebral level or angle of Louis	

HISTOLOGY	
Histology of respiratory epithelium and its variations in different parts of conducting system	
114. Identify the respiratory epithelium on microscope	Practical
115. Describe respiratory epithelium	
116. Discuss the component cells of respiratory epithelium	
117. Discuss the variations of epithelium in different parts of conducting system of respiratory tracts	
Histology of trachea and lung	
118. Describe the histological features of different layers of trachea	Practical
119. Describe divisions of bronchial tree	
120. Discuss the structural variation in different parts of bronchial tree	
121. Describe the structure of alveoli and inter-alveolar septum	
122. Relate the functions of different type of cells, forming the alveolar wall	
123. Describe the structure and function of blood -air barrier	
124. Identify mix glands in the mucosa of tracheal wall	

BIOCHEMISTRY

OBJECTIVES	TEACHING STRATEGY
Phospholipids	
1. Explain chemical structure of phospholipids and their biochemical role in Acute Respiratory Distress Syndrome (ARDS)	Interactive Lecture
Acid Base Balance I	
2. Discuss the normal regulation of pH, normal Arterial Blood Gases (ABGs), anion gap and their biochemical significance	Interactive Lecture
Acid Base Balance II	
3. Explain the mechanism of Respiratory pH disturbances and their ABGs	Interactive Lecture
Acid Base Balance III	
4. Explain the mechanism of metabolic pH disturbances and their ABGs	Interactive Lecture
ABGs	Tutorials
5. Interpret ABGS in different clinical conditions	
CLINICAL APPLICATION	
6. Classify given case scenarios into Obstructive & Restrictive lung diseases	
7. Predict lung volumes & capacities in each case	Practical
pH meter	
8. Demonstrate the use of pH meter to estimate pH of Gastric juice, Plasma, Saliva & Urine	

PHYSIOLOGY

OBJECTIVES	TEACHING STRATEGY
Mechanics of respiration	
1. Briefly describe the function of respiratory passages	Interactive Lectures
2. Explain mechanism of pulmonary ventilation with reference to thoracic cage & muscles of respiration	
3. Define alveolar pressure & pleural pressure, alveolar ventilation	
4. Discuss trans-pulmonary pressure and its changes during respiration	
5. Define dead space	
Lung compliance	
6. Define lung compliance & list factors affecting lung compliance	Interactive Lectures
7. Describe the role of surfactant in maintain lung compliance	
8. Differentiate compliance work, tissue resistance work & airway resistance work	
Pulmonary volumes and capacities	
9. List the pulmonary volumes & capacities with their normal values & significance in pulmonary function test	Interactive Lectures
10. Determine functional residual capacity, residual vol. & total lung capacity, helium dilution method	
Pulmonary circulation V/Q relationship	
11. Describe pressure in pulmonary circulation & blood flow three various zones of lung (1, 2, 3)	Interactive Lectures
12. Explain pulmonary capillary dynamics	
13. Explain mechanism of development of pulmonary Edema, Understand importance of ventilation /perfusion	
14. Discuss the Ratio & effects of mismatching of this ratio	
Diffusion of gases	
15. Define respiration unit & respiration membrane	Interactive Lectures
16. Describe mechanics of diffusion across respiration membrane & factors effecting diffusion	
17. List partial pressure of respiration gases in atmosphere, humidified, alveolar & expired air	
18. Briefly described the diffusing capacity of O2 and CO2	
O2 transport O2Hb curve	
19. Explain transport of O2 from lungs to body tissues	Interactive Lectures
20. Briefly describe the role of Hb in O2 transport	
21. Explain oxy-Hb dissociation curve and factors that shift this curve	
22. Define Bohr effect	
23. Discuss the fundamental of ABGs	

Transport of Co2 in relation to physiology	
24. Describe the carriage in blood (chloride shift)	Interactive Lectures
25. Relate effect of CO2 and O2 transport (Haldane effect)	
26. Define respiratory exchange ratio	
Respiratory adjustment to exercise, high altitude & deep sea	
27. Describe respiratory adjustments during exercise & VO ₂ Max.	Interactive Lecture
28. Explain physiology of acclimatization	
29. Explain physiology of deep sea diving	
Hypoxia and its type	
30. Define hypoxia and its types	Interactive Lecture
31. Describe coughing & sneezing reflex	
Regulation of respiration	
32. List the respiratory centers & their effect on regulation of respiration	Interactive Lecture
33. Describe the chemical control of respiration (chemoreceptors)	
Dyspnea & its causes	
34. Explain the pulmonary causes of dyspnea	Interactive Lecture
Lung Diseases	
35. Differentiate between Obstrucive vs restrictive lung disease	Interactive Lecture
Recording of normal respiratory rate	
36. Record normal respiratory rate, breath holding time after inspiration & expiration	Practicals
Pulmonary Function Tests	
37. Determine lung volumes and capacities by Spirometry (Powerlab)	Practicals

RSDC

OBJECTIVES	TEACHING STRATEGY
Respiratory system examination	
1. Demonstrate the correct steps and sequence of respiratory system examination on a mannequin/ dummy/ simulated	Hands-On

LEARNING RESOURCES

<i>SUBJECT</i>	<i>RESOURCES</i>
ANATOMY	A. <u>GROSS ANATOMY</u> <ol style="list-style-type: none"> 1. K.L. Moore, Clinically Oriented Anatomy 2. Neuro Anatomy by Richard Snell B. <u>HISTOLOGY</u> <ol style="list-style-type: none"> 1. B. Young J. W. Health Wheather's Functional Histology C. <u>EMBRYOLOGY</u> <ol style="list-style-type: none"> 1. Keith L. Moore. The Developing Human 2. Langman's Medical Embryology
BIOCHEMISTRY	A. <u>TEXTBOOKS</u> <ol style="list-style-type: none"> 1. Harper's Illustrated Biochemistry 2. Lehninger Principle of Biochemistry 3. Biochemistry by Devlin
PHYSIOLOGY	A. <u>TEXTBOOKS</u> <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 B. <u>REFERENCE BOOKS</u> <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

ADDITIONAL LEARNING RESOURCES

<u>Hands-on Activities/ Practical</u>	Students will be involved in Practical sessions and hands-on activities that link with the respiratory-I module to enhance learning with understanding.
<u>Labs</u>	<ul style="list-style-type: none">Utilize the lab to relate the knowledge to the specimens and models available.
<u>Skill Lab</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>	It increases 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)
- **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 ST YEAR	MONTH
WEEK 1	FOUNDATION MODULE	3 rd Feb 2020
WEEK 2		
WEEK 3		
WEEK 4		
WEEK 5		
WEEK 6		13 th March 2020
WEEK 1	BLOOD MODULE	6 th April 2020
WEEK 2		
WEEK 3		
WEEK 4		
WEEK 5		
WEEK 6		11 th May 2020
WEEK 1	RESPIRATORY MODULE - I	30 th May 2020
WEEK 2		
WEEK 3		
WEEK 4		19 th June 2020