



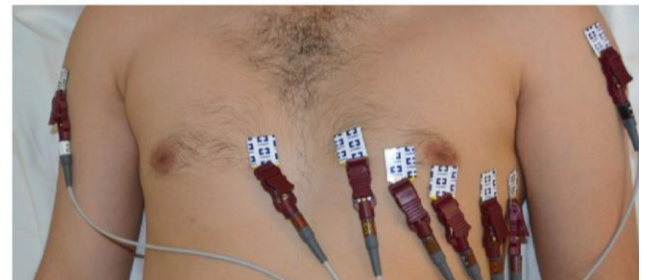
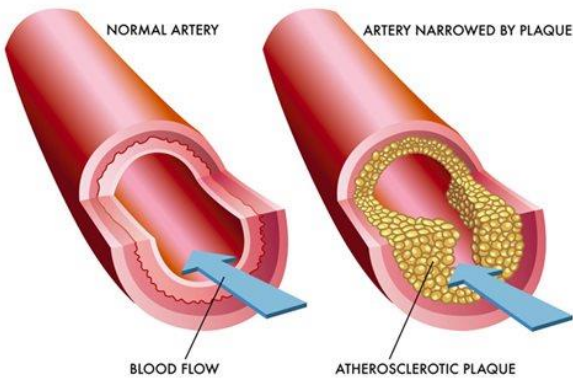
# STUDY GUIDE

## CARDIOVASCULAR SYSTEM MODULE-I

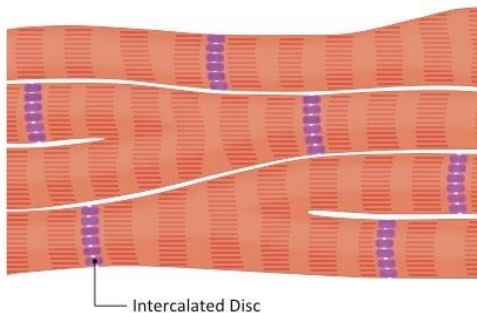
### FIRST YEAR MBBS

24<sup>th</sup> Jul – 17<sup>th</sup> Aug 2019

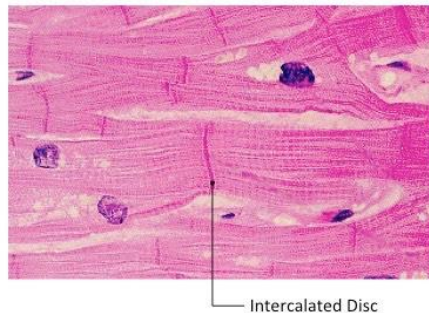
#### ATHEROSCLEROSIS



#### Cardiac Muscle Diagram



#### Cardiac Muscle Microscopy



**LIAQUAT NATIONAL HOSPITAL  
& MEDICAL COLLEGE**



**STUDY GUIDE FOR CARDIOVASCULAR SYSTEM MODULE-I**

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Module name: **Cardiovascular System-I**

Semester: **Two**

Year: **One**

Duration: **4 weeks (Jul – Aug 2019)**

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

### MODULE INTEGRATED COMMITTEE

<b>MODULE COORDINATOR:</b>	<ul style="list-style-type: none"> <li>Dr. Ahsan Ashfaq (Physiology)</li> </ul>
<b>CO-COORDINATORS:</b>	<ul style="list-style-type: none"> <li>Dr. Hanna Naqvi (Pathology)</li> <li>Dr. Muhammad Suleman (DHCE)</li> </ul>

### DEPARTMENTS' & RESOURCE PERSONS' FACILITATING LEARNING

BASIC HEALTH SCIENCES	CLINICAL AND ANCILLARY DEPARTMENTS
<b>ANATOMY</b> <ul style="list-style-type: none"> <li>Professor Zia-ul-Islam</li> </ul>	<b>RADIOLOGY</b> <ul style="list-style-type: none"> <li>Dr. Misbah Tahir</li> </ul>
<b>BIOCHEMISTRY</b> <ul style="list-style-type: none"> <li>Dr. Kashif Nisar</li> </ul>	<b>RESEARCH &amp; SKILLS DEVELOPMENT CENTER</b> <ul style="list-style-type: none"> <li>Dr. Kakhkashan Tahir</li> </ul>
<b>PHYSIOLOGY</b> <ul style="list-style-type: none"> <li>Professor Syed Hafeezul Hassan</li> </ul>	
<b>DEPARTMENT of HEALTHCARE EDUCATION</b>	
<ul style="list-style-type: none"> <li>Professor Nighat Huda</li> </ul>	<ul style="list-style-type: none"> <li>Dr. Sobia Ali</li> <li>Dr. Mehnaaz Umair</li> <li>Dr. Afifa Tabassum</li> </ul>
<b>LNH&amp;MC MANAGEMENT</b>	
<ul style="list-style-type: none"> <li>Professor Karimullah Makki, Principal, LNH&amp;MC</li> <li>Dr. Shaheena Akbani, Director A.A &amp; R.T LNH&amp;MC</li> </ul>	
<b>STUDY GUIDE COMPILED BY: Department of Health Care Education</b>	<ul style="list-style-type: none"> <li>Dr. Muhammad Suleman Sadiq</li> <li>Dr. Afifa Tabassum</li> </ul>

## **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:**

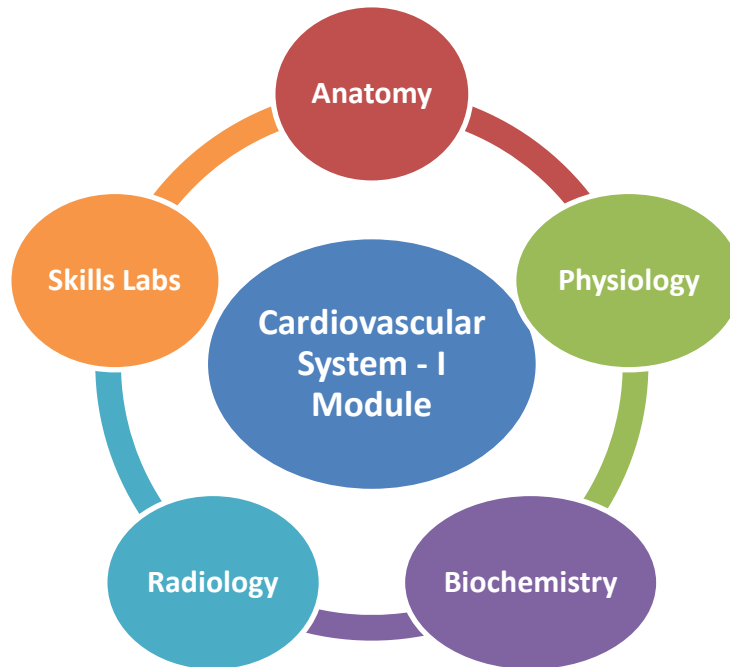
- Communicates information on organization and management of the module.  
This will help the student to contact the right person in case of any difficulty.
- Defines the objectives which are expected to be achieved at the end of the module.
- Identifies the learning strategies such as lectures, small 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 1<sup>st</sup> & 2<sup>nd</sup> semesters.

**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 are characteristics of integrated teaching program.

## INTEGRATING DISCIPLINES OF CVS-I MODULE

**LEARNING METHODOLOGIES**

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

- Interactive Lectures
- Hospital / Clinic visits
- Small Group Session
- Case- Based Learning
- Practicals
- Skills session
- Self 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.

**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 5 : CARDIOVASCULAR SYSTEM-I**

### **INTRODUCTION**

Welcome to the Cardiovascular System Module-I. In the next four weeks you will have the opportunity to develop understanding of the basic concepts of cardiovascular system through an integrated course designed by basic and clinical sciences faculty.

Heart being the main organ of cardiovascular system is responsible for distributing blood all over human body. A perfectly functioning cardiovascular system is so important for human body, that if it stops for a minute, rapid death may occur. In the 3<sup>rd</sup> year in cardiovascular system - II module students will learn in depth about the cardiovascular diseases.

In Pakistan cardiovascular diseases account for about 19% of all deaths and about 38% of deaths occurring due to non-communicable diseases. It is also one of the leading causes of illness and reduces quality of life.

The medical curriculum is not only the study of disease outcomes but also about “prevention being better than cure” Unhealthy lifestyle choices such as rich fat diet, overweight, smoking, increase the risk of cardiovascular diseases. Therefore as a medical student it is important to understand how the risk of cardiovascular disorders can be reduced by adapting healthy lifestyle.

We hope you enjoy the next four weeks. There will be other modules ahead, but a good grounding in cardiovascular module will be an important stage of your journey through this system-based course. As a physician you are expected to manage individuals, families and communities on prevention of illnesses including cardiac disorders

1. *World Health Organization – Non-communicable Diseases (NCD) Country Profiles, 2014*

**COURSE OBJECTIVES AND STRATEGIES**

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

**ANATOMY**

<b>TOPICS &amp; OBJECTIVES</b>	<b>TEACHING STRATEGIES</b>
<b><u>Embryology:</u></b> <ul style="list-style-type: none"> <li>• Explain the development of cardiovascular system</li> </ul>	Interactive Lectures
<ul style="list-style-type: none"> <li>• Describe the following congenital heart defects:               <ol style="list-style-type: none"> <li>a. Atrial septal defect</li> <li>b. Ventricular septal defect</li> <li>c. Tetralogy of Fallot</li> <li>d. Patent Ductus Arteriosus</li> <li>e. Transposition of great vessels</li> </ol> </li> </ul>	
<ul style="list-style-type: none"> <li>• Describe the development of aortic arches</li> </ul>	
<ul style="list-style-type: none"> <li>• Describe fetal circulation with relation to changes that occur at birth</li> </ul>	
<b><u>Histology:</u></b> <ul style="list-style-type: none"> <li>• Describe the microscopic features of               <ol style="list-style-type: none"> <li>a. Artery</li> <li>b. Vein</li> <li>c. Lymph vessels</li> </ol> </li> </ul>	Interactive Lecture & Practical
<ul style="list-style-type: none"> <li>• Describe the microscopic features of cardiac muscle</li> </ul>	Practical
<b><u>Gross Anatomy:</u></b> <ul style="list-style-type: none"> <li>• Describe pericardium and pericardial sinuses</li> </ul>	Lecture
<ul style="list-style-type: none"> <li>• Describe internal structure of heart</li> </ul>	Demonstration
<ul style="list-style-type: none"> <li>• Describe heart wall and fibrous skeleton</li> </ul>	Interactive Lectures
<ul style="list-style-type: none"> <li>• Describe the gross anatomy of heart valves</li> </ul>	
<ul style="list-style-type: none"> <li>• Identify the anatomical position, borders and surfaces of the heart</li> </ul>	Interactive Lectures & Demonstrations
<ul style="list-style-type: none"> <li>• Demonstrate the surface marking of               <ol style="list-style-type: none"> <li>a. Heart</li> <li>b. Aorta</li> <li>c. Superior vena cava</li> </ol> </li> </ul>	



<ul style="list-style-type: none"> <li>• Perform Precordial examination on human subject</li> </ul>	Demonstration
<ul style="list-style-type: none"> <li>• Describe the position, extent and branches of :             <ol style="list-style-type: none"> <li>a. Ascending aorta</li> <li>b. Arch of aorta</li> <li>c. Descending aorta</li> </ol> </li> </ul>	
<ul style="list-style-type: none"> <li>• Describe pulmonary trunk, superior vena cava, inferior vena cava and brachiocephalic vein</li> </ul>	
<ul style="list-style-type: none"> <li>• Explain the role of lymphatic's in prevention of edema</li> </ul>	Case-Based Learning
<ul style="list-style-type: none"> <li>• Describe the neurovascular supply of heart in context to ischemic heart diseases</li> </ul>	

## BIOCHEMISTRY

<b>TOPICS &amp; OBJECTIVES</b>	<b>TEACHING STRATEGIES</b>
<b><u>Lipid Metabolism:</u></b> <ul style="list-style-type: none"> <li>• Describe the process of digestion and absorption of Lipids and its significance in CVS disease</li> </ul>	Interactive Lectures
<ul style="list-style-type: none"> <li>• Explain the process of synthesis &amp; catabolism of fatty acids and their clinical significance.</li> </ul>	Interactive Lecture/tutorial
<ul style="list-style-type: none"> <li>• Discuss Lipoproteins and their clinical significance in CVS disease</li> </ul>	
<ul style="list-style-type: none"> <li>• Describe Ketone Bodies' synthesis, functions and Ketoacidosis</li> </ul>	
<ul style="list-style-type: none"> <li>• Discuss the biochemical role of Eicosanoids and their clinical significance</li> </ul>	Interactive Lecture
<ul style="list-style-type: none"> <li>• Discuss the metabolism and functions of Cholesterol and its clinical significance in CVS diseases</li> </ul>	Interactive Lecture
<ul style="list-style-type: none"> <li>• Discuss the biochemical role of oxidants and antioxidants</li> <li>• Discuss their specific role in the progression of CVS diseases</li> </ul>	Interactive Lecture/tutorial
<ul style="list-style-type: none"> <li>• Explain the role of minerals in hypertension</li> </ul>	Practical
<ul style="list-style-type: none"> <li>• Discuss the importance of lipid profile in CVS diseases</li> </ul>	
<ul style="list-style-type: none"> <li>• Estimate and interpret the TAGs in the given sample</li> </ul>	
<ul style="list-style-type: none"> <li>• Estimate the total cholesterol, HDL, LDL in the serum</li> <li>• Interpret the results</li> <li>• Discuss the importance of this test for the diagnosis of CVS disease</li> </ul>	
<ul style="list-style-type: none"> <li>• Estimate CKMB in given sample</li> <li>• Discuss the importance of cardiac enzymes as markers of CVS disease.</li> </ul>	

## PHYSIOLOGY

<b>TOPICS &amp; OBJECTIVES</b>	<b>TEACHING STRATEGIES</b>
<ul style="list-style-type: none"> <li>Describe the Physiologic anatomy of heart and properties of cardiac muscles</li> </ul>	Interactive Lectures
<ul style="list-style-type: none"> <li>Explain the phenomenon of generation of action potential in cardiac muscle &amp; process of excitation contraction coupling</li> </ul>	
<ul style="list-style-type: none"> <li>Describe conducting system of heart &amp; role of pacemaker in maintaining cardiac rhythm</li> </ul>	
<ul style="list-style-type: none"> <li>Explain neural regulation of heart through autonomic nervous system &amp; its effect on cardiac rate (chronotropic), force of contraction (ionotropic), &amp; velocity of conduction (dromotropic) on junctional tissue</li> </ul>	
<ul style="list-style-type: none"> <li>Describe events of cardiac cycle &amp; associated events ( pressure changes, heart sound generation, &amp; effect on volume of heart chambers &amp; vessels)</li> </ul>	
<ul style="list-style-type: none"> <li>Analyze and interpret ECG/vectors</li> </ul>	Interactive Lectures
<ul style="list-style-type: none"> <li>Define principles of hemodynamics applicable to heart/blood vessels</li> </ul>	
<ul style="list-style-type: none"> <li>Define cardiac output and factors regulating cardiac output</li> </ul>	
<ul style="list-style-type: none"> <li>Explain preload/after load &amp; its effect on heart</li> </ul>	Interactive Lectures
<ul style="list-style-type: none"> <li>Define arterial blood pressure &amp; state mechanism of regulation of blood pressure (short, intermediate, long term)</li> </ul>	
<ul style="list-style-type: none"> <li>Record blood pressure and explain changes in arterial pressure in different body positions (lying, upright, standing)</li> </ul>	Practical
<ul style="list-style-type: none"> <li>Explain Hypertension</li> </ul>	Interactive Lectures
<ul style="list-style-type: none"> <li>Define capillary fluid shift mechanism</li> </ul>	
<ul style="list-style-type: none"> <li>Explain auto regulation of local blood flow and list vasodilator / vasoconstrictor</li> </ul>	
<ul style="list-style-type: none"> <li>Describe cardiovascular adaptation to exercise</li> </ul>	
<ul style="list-style-type: none"> <li>Enlist content of lymph and lymphatic circulation</li> </ul>	
<ul style="list-style-type: none"> <li>Describe Circulatory shock</li> </ul>	
<ul style="list-style-type: none"> <li>Demonstrate proper arrangement of ECG machine and placement of its leads on human subject</li> <li>Interpret Normal ECG waves</li> </ul>	Practical
<ul style="list-style-type: none"> <li>Demonstrate the refractory period of cardiac muscle through power lab</li> </ul>	

<ul style="list-style-type: none"> <li>• Predict changes in the cardiac cycle based on given disease conditions</li> </ul>	Tutorial
<ul style="list-style-type: none"> <li>• Differentiate between cardiac and respiratory causes of dyspnoea in given clinical scenarios.</li> <li>• Select relevant investigations for such patients</li> <li>• Predict results of investigations for such patients</li> </ul>	
<ul style="list-style-type: none"> <li>• Differentiate between normal and abnormal ECGs</li> <li>• Diagnose most common cardiac conditions based on ECG changes</li> </ul>	

### RADIOLOGY

<i>TOPICS &amp; OBJECTIVES</i>	<i>TEACHING STRATEGIES</i>
<ul style="list-style-type: none"> <li>• Describe the normal cardiovascular anatomy on chest X Ray</li> </ul>	Small group Discussion

### RESEARCH AND SKILLS LAB

<i>TOPICS &amp; OBJECTIVES</i>	<i>TEACHING STRATEGIES</i>
<ul style="list-style-type: none"> <li>• Assess the vital signs of the patient including: <ul style="list-style-type: none"> <li>○ Respiratory Rate</li> <li>○ Pulse</li> <li>○ Temperature</li> <li>○ O<sub>2</sub> Saturation</li> <li>○ Blood pressure by palpatory and auscultatory methods</li> </ul> </li> </ul>	Demonstration/ hands on practice
<ul style="list-style-type: none"> <li>• Describe and auscultate heart sounds (Physiology)</li> </ul>	



***Apart from attending daily scheduled sessions, students too should engage in self-study to ensure that all the objectives are covered.***

**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> </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. Keith L. 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 Indu Khurana</li> <li>4. Short Textbook Of Physiology by Mrthur</li> <li>5. NMS Physiology</li> </ol>

**ADDITIONAL LEARNING RESOURCES**

<b><u>Hands-on Activities/ Practical</u></b>	Students will be involved in Practical sessions and hands-on activities that link with the CVS module-I to enhance learning with understanding.
<b><u>Labs</u></b>	Utilize the lab to relate the knowledge to the specimens and models available.
<b><u>Skill Lab</u></b>	A skills lab provides the simulators to learn the basic skills and procedures. This helps build the confidence to approach the patients.
<b><u>Videos</u></b>	Video familiarize the student with the procedures and protocols to assist patients.
<b><u>Computer Lab/CDs/DVDs/Internet Resources:</u></b>	To increase the knowledge students should utilize the available internet resources and CDs/DVDs. This will be an additional advantage to increase learning.
<b><u>Self Learning</u></b>	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:****Theory:**

- **Best Choice Questions (BCQs)** also known as MCQs (Multiple Choice Questions) are used to assess objectives covered in each module.
  - A BCQ has a statement or clinical scenario followed by four options (likely answer).
  - Students after reading the statement/scenario select ONE, the most appropriate response from the given list of options.
  - **Correct answer carries one mark, and incorrect 'zero mark'. There is no negative marking.**
  - Students mark their responses on specified computer-based/OMR sheet designed for LNHMC.

**OSPE/OSCE: Objective Structured Practical/Clinical Examination:**

- Each student will be assessed on the same content and have same time to complete the task.
- Comprise of 12-25 stations.
- Each station may assess a variety of clinical tasks, these tasks may include history taking, physical examination, skills and application of skills and knowledge
- Stations are observed, unobserved, interactive and rest stations.
- Observed and interactive stations will be assessed by internal or external examiners.
- Unobserved will be static stations in which there may be an X-ray, Labs reports, pictures, clinical scenarios with related questions for students to answer.
- Rest station is a station where there is no task given and in this time student can organize his/her thoughts.

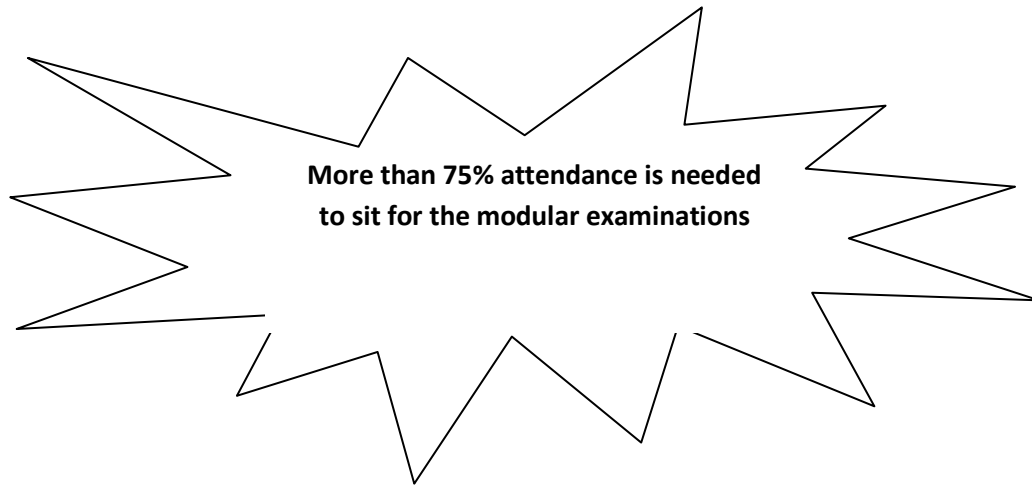
**Internal Evaluation**

- Students will be assessed to determine achievement of module objectives through the following:
  - **Module Examination:** will be scheduled on completion of each module. The method of examination comprises theory exam which includes BCQs and OSPE (Objective Structured Practical Examination).
  - **Graded Assessment of students by Individual Department:** Quiz, viva, practical, assignment, small group activities such as CBL, TBL, TOL, online assessment, ward activities, examination, and log book.
- Marks of both modular examination and graded assessment will constitute 20% weightage.
- As per JSMU policy, this 20% will be added by JSMU to Final Theory Examination.

Example : Number of Marks allocated for Final Theory and Internal Evaluation			
	Final Examination Theory Marks	Internal Evaluation (Class test + Assignments + Modular Exam)	Total (Theory)
	80%	20%	100%

### 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



**MODULAR EXAMINATION RULES & REGULATIONS (LNH&MC)**

- 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.

**JSMU Grading System**

- It will be based on GPA – 4 system

Marks obtained in Percentage range	Numerical Grade	Alphabetical Grade
80-100	4.0	A+
75-79	4.0	A
70-74	3.7	A-
67-69	3.3	B+
63-66	3.0	B
60-62	2.7	B-
56-59	2.3	C+
50-55	2.0	C
<50 Un-grade-able	0	U

- A candidate obtaining GPA less than 2.00 (50%) is declared un-graded (fail).
- Cumulative transcript is issued at the end of clearance of **all** modules.



**SCHEDULE:**

WEEKS	1 <sup>ST</sup> YEAR	MONTH
WEEK 1	FOUNDATION MODULE	9 <sup>th</sup> Feb 2019
WEEK 2		26 <sup>th</sup> March 2019
WEEK 3		
WEEK 4		
WEEK 5		
WEEK 6		
	MODULAR EXAM	28 <sup>th</sup> & 29 <sup>th</sup> March
WEEK 1	BLOOD MODULE	1 <sup>st</sup> April 2019
WEEK 2		27 <sup>th</sup> April 2019
WEEK 3		
WEEK 4		
	MODULAR EXAM	29 <sup>th</sup> & 30 <sup>th</sup> April 2019
WEEK 1	LOCOMOTOR MODULE	2 <sup>nd</sup> May 2019
WEEK 2		29 <sup>th</sup> June 2019
WEEK 3		
WEEK 4		
WEEK 5		
WEEK 6		
WEEK 7		
WEEK 8		
	MODULAR EXAM	1 <sup>st</sup> & 2 <sup>nd</sup> July 2019
WEEK 1	RESPIRATORY MODULE - I	3 <sup>rd</sup> July 2019
WEEK 2		27 <sup>th</sup> July 2019
WEEK 3		
WEEK 4		
WEEK 1	CVS MODULE - I	24 <sup>th</sup> July 2019
WEEK 2		17 <sup>th</sup> Aug 2019
WEEK 3		
WEEK 4		
	MODULAR EXAM (Respiratory-I & CVS-I)	19 <sup>th</sup> & 20 <sup>th</sup> Aug 2019*

\*Final dates will be announced later