

Dow University of Health Sciences

CARDIOVASCULAR- I MODULE STUDY GUIDE 2023

First Year MBBS



S.No	TABLE OF CONTENTS	Page no.
1	Introduction to Study Guide	3
2	Five Year Curricular Organization	5
3	Overview	6
4	Integrated Module Committee	7
5	Module description	8
6	Rationale	9
7	Learning Outcomes, Objectives and T/L Strategies	9-17
10	Assessment Methods	18
11	Learning Resources	19

INTRODUCTION

WHAT IS A STUDY GUIDE?

A study guide provides a focus for different educational activities in which the students are engaged. It equips students with information on the topic of study and assists in management of student learning. Furthermore, it imparts relevant information about the organization of the module and thus helps students organize their educational activities accordingly. Another important purpose of a study guide is the dissemination of information about rules and policies and teaching and assessment methods.

HOW DOES A STUDY GUIDE HELP LEARNERS?

- Includes information on organization and management of the module.
- Advises the learners about representatives (from various departments) who can be contacted in case of need.
- Defines the objectives which are expected to be achieved at the end of the module.
- Elaborates the learning strategies which will be implemented during the module.
- Informs learners about the learning resources in order to maximize their learning.
- Provides information on the assessment methods that will be held to determine every student's achievement of objectives.

CURRICULUM MODEL:

Integrated modular curriculum is followed at Dow University of Health Sciences for MBBS program. This implies that instead of studying basic and clinical sciences separate and apart, students will experience a balanced and integrated combination of basic and clinical sciences in the form of a system –based modules.

The modular curriculum followed by Dow University of Health Sciences is integrated both in the vertical and the horizontal directions. However, in order to prepare the students for clinical teaching with a sound background knowledge of the basic sciences, the curriculum has been divided in three spirals.

The three spirals are:

1. Spiral -1 Basic Sciences
2. Spiral -2 Clinical Sciences
3. Spiral -3 Integrated Supervised Practical Training

The Basic Sciences Spiral is spread over the first two years and clinical sciences spiral is distributed

over the next two years. In the final year students are given practical hands on training in the role similar to that of a shadow house officer. They are encouraged to refer to the theoretical teaching of the first four years for their practical training. The whole curriculum is divided into modules, each module being related to a particular system for example. Cardiovascular 1 module is in the Basic Sciences Spiral and Cardiovascular 2 module is in the Clinical Sciences Spiral.

TEACHING & LEARNING METHODOLOGIES:

The following teaching/ learning methods may be used to facilitate the learning process:

1. **Interactive Lectures:** Lectures are considered as an efficient means of transferring knowledge to large audiences.
2. **Small Group Discussion:** Small group discussion such as case- based learning (CBL) is a form of and interactive learning which helps students develop discussion skills and critical thinking.
3. **Practical:** Practical related to Basic Sciences are held to facilitate student learning.
4. **Skills:** Skills sessions are scheduled parallel with various modules at fully equipped skills lab in which students observe and learn skills relevant to the respective modules.
5. **Self-Directed Learning:** Students have a measure of control over their own learning. They diagnose their needs, set objectives in accordance to their specific needs, identify resources and adjust their pace of learning

5 YEAR CURRICULAR ORGANIZATION

Spiral	year	Modules				
First Spiral	I	FND1- Foundation Cell, Genetics & Cell Death (Basics of Anatomy, Physiology, Biochemistry, Gen. Pathology, Gen. Pharmacology, Community Medicine & Behavioral Sciences, 9 Weeks		HEM1- Blood Module Immunity, Inflammation, Tissue repair, Antimicrobials & Neoplasia 9 Week		
		LCM1- Locomotion Bones, Joints, Nerves & Muscles, 9weeks		RSP1- Respiratory	CVS1- Cardiovascular	
	II	NEU1- Nervous System 8 weeks		HNN1- Head & Neck &	END1- Endocrinology	
		GIL 1-GIT and Liver 8 weeks		EXC1- Renal and Excretory	REP1- Reproductive System 5 weeks	
Second Spiral	III	Foundation 2 2 wks	IDD 1- Infectious diseases 6 weeks	HEM2- Hematology 5 weeks	RSP2- Respiratory System 5 weeks	CVS2- Cardiovascular System 4 weeks
		GIL 2-GIT and Liver (including Nutritional Disorders) 8weeks			EXC2- Renal & Excretory System 4 weeks	END2- Endocrinology 5 weeks
	IV	ORT2- Orthopedics, Rheumatology, Trauma 7 weeks		PMR-Physical Medicine & Rehabilitation DPS-Dermatology Plastic Surgery / Burns		REP2- Reproductive System 8 Weeks
		NEU2- Neurosciences and Psychiatry 8 weeks			ENT* 4 weeks	OPHTHALMOLOG Y/EYE 4 weeks
Third Spiral	V	Clinical Rotation 9:45 to 3:00 (with Ambulatory, Emergency, Intensive care) In Medicine, Pediatrics, Cardiology and Neurology units <ul style="list-style-type: none"> ▪ Lecture on problem-based approach, twice a week ▪ Ward tutorial twice a week ▪ Student research presentation once a week 			Clinical Rotation 9:45 to 3:00 (Inpatient, Ambulatory, Emergency, Intensive care and Operation Theatres) In Surgery, Gynecology & Obstetrics, Orthopedics and Neurosurgery. <ul style="list-style-type: none"> ▪ Lecture on problem based approach, twice a week ▪ Ward tutorial twice a week ▪ Student research presentation once a week 	

OVERVIEW

Program	MBBS	
Year	One	
Module Title	Cardiovascular	
Module Code	CVS-1	
Duration	4 weeks	
Contact Hours	Anatomy	25
	Biochemistry	16
	Physiology	38
	Pathology	13
	Pharmacology	9.5
	Community medicine	2
	Behavioral sciences	4
	Radiology	1
	Skill Lab	1.5
Total Hours	Cardiovascular Module	110

INTEGRATED MODULE COMMITTEE

<u>RESPONSIBILITIES</u>	<u>NAMES</u>	<u>DESIGNATION</u>	<u>EMAILS</u>
<u>Chairperson</u> <u>Curriculum Review</u> <u>Committee & Chief</u> <u>Module coordinator</u>	<u>Prof Naheed Khan</u>	<u>Chairperson &</u> <u>Professor Anatomy</u>	<u>naheed.khan@duhs.edu.pk</u>
<u>Coordinator</u>	<u>Dr. Sabahat Babar</u>	<u>Lecturer</u>	<u>sabahat.babar@duhs.edu.pk</u>
<u>Co-coordinator</u>	<u>Dr. Aisha Hasan Brohi</u>	<u>Assistant Professor</u>	<u>aisha.hassan@duhs.edu.pk</u>
<u>Co-coordinators</u>	<u>Dr Afshan Mehboob</u>	<u>Associate Professor</u>	<u>afshan.khan@duhs.edu.pk</u>
<u>Department</u>	<u>RESOURCE PERSON</u>	<u>DESIGNATION</u>	<u>EMAILS</u>
<u>Medical education</u>	<u>Dr Munizha Nisar</u>	<u>Medical Simulation</u> <u>Facilitator</u>	<u>munizha.nisar@duhs.edu.pk</u>
	<u>Dr Nooreen Adnan</u>	<u>Senior Lecturer</u>	<u>nooreen.adnan@duhs.edu.pk</u>

MODULE DESCRIPTION:

This module has been designed for students to introduce them to the basic concepts of Hematology. This module includes Gross anatomy, Histology, Embryology, Physiology, Biochemistry, Pathology, Pharmacology, Behavioral sciences, Radiology and Community medicine.

Lectures, tutorials, small group sessions including CBL and practical are important components of this module. Clinical skills such as examination of cardiovascular system & technique of auscultation of heart is included in this module. You will be able to develop problem solving skills to apply your medical knowledge to practical situations by means of group and individual tasks. This study guide has been developed to assist you and keep you focused to achieve your goals.

Welcome to the cardiovascular module and it is hoped that students will be able to achieve the desired module learning outcomes.

RATIONALE:

The inclusion of a cardiovascular module in the first year of medical studies serves several important educational and clinical rationales. Cardiovascular medicine is fundamental to understanding the circulatory system and is essential for comprehending many other medical specialties. Teaching it early in the curriculum provides students with a strong foundation. Cardiovascular diseases, including heart disease and hypertension, are among the leading causes of morbidity and mortality worldwide. Educating students about these conditions early on helps prepare them to address a significant healthcare issue. It prepares them for their future roles as healthcare providers, researchers, and advocates for cardiovascular health.

LEARNING OUTCOMES:

At the end of Five years MBBS program, student shall be able to:

- Apply their knowledge to solve clinical problems, including differential diagnosis and treatment planning for cardiovascular diseases.
- Develop basic skills in performing cardiovascular physical examination.
- Manage acute cardiac emergencies, such as cardiac arrest, acute myocardial infarction, and cardiogenic shock, with advanced life support skills.
- Advocate for policies and practices that improve cardiovascular health on a local, national, or global scale.

MODULE OBJECTIVES:

The 1st year MBBS student at the end of module shall be able to:

- Describe the structure and function of the heart, blood vessels, and the circulatory system.
- Understand the cardiac cycle and the events of the cardiac cycle.
- Learn the normal radiological anatomy of cardiovascular system.
- Explain the common cardiovascular diseases and conditions, such as hypertension, atherosclerosis, and heart failure.
- Understand the risk factors for cardiovascular diseases.
- Describe the pathogenesis and clinical manifestations of these diseases.
- Understand the mechanisms of action of common cardiovascular drugs.
- Understand the importance of cardiovascular disease prevention at the individual and population levels.
- Learn about public health strategies for reducing the burden of cardiovascular diseases.
- Learn to take a comprehensive cardiovascular history from patients.
- Perform a cardiovascular physical examination, including inspection, palpation, percussion, and auscultation.

DISCIPLINE-WISE LEARNING OBJECTIVES AND CONTENTS**ANATOMY****Learning Objectives:****GROSS**

- Describe the gross anatomy of the pericardium along with its applied anatomy.
- Explain the gross anatomical features, conductive system, and neurovascular supply of heart.
- Correlate the structural anatomy of heart with the common clinical conditions.

HISTOLOGY

- Explain the microscopic features of cardiac muscle.
- Describe the microscopic features of small, medium and large size arteries and veins along with differentiation between muscular and elastic arteries.

EMBRYOLOGY

- Describe the development of the heart, aortic arches and venous system of the heart.
- Discuss congenital anomalies of the heart.
- Differentiate between fetal and adult circulation.

Topics/content:**Lectures: (1 hour each)****GROSS:**

- Overview of CVS
- Conducting system and Nerve supply of heart
- Overview of Coronary blood vessels
- Overview of principle arteries of CVS
- Overview of principle veins of CVS
- Overview of Lymphatic system

HISTOLOGY:

- Histology of blood vessels
- Histology of Heart

EMBRYOLOGY:

- Early Development of heart
- Late Development of heart & partitioning of heart
- Development of Arterial & Venous System
- Anomalies of Heart, arteries and vein.
- Fetal circulation

DEMONSTRATION: (1.5 hours each)

- Heart: covering (pericardium) and external features

- Heart: Internal-features 1
- Heart: Internal-features 2
- Heart, (surface marking of heart and valves, great vessels).
- Blood supply of heart (clinical anatomy)

PRACTICALS: (1.5 hours each)

- Histology of blood vessels
- Histology of Heart

PHYSIOLOGY

Learning Objectives:

- Explore cardiac muscle and conduction, differentiate cardiac and skeletal muscle, and distinguish autorhythmic from contractile cardiac fibers.
- Explain cardiac contractile fiber action potentials, describe the heart's conducting system, and compare ion effects on cell membrane potentials.
- Identify conduction system parts and functions, explain heart rhythm origins, and understand the SA node's role as the pacemaker.
- Discover the role of the cardiac conduction system in arrhythmias, conduction system creation, development and disease, and cardiac cycle blockages.
- Learn about depolarization, ECG deflection size, and cardiac contraction/relaxation by connecting ECG waveforms to heart function.
- Recognize that a parallel depolarization vector maximizes ECG deflection and predict the lead setup for the largest ECG amplitude.
- Explore the diagnostic value of ECGs in cardiac disorders and examine atrial fibrillation, premature ventricular contractions, ventricular fibrillation, and asystole/ventricular standstill ECG patterns.
- Identify and differentiate a range of arrhythmias from rhythm strips, including sinus, atrial, junctional, ventricular rhythms, and AV blocks.
- Describe systolic phases, link ECG, mechanical, auditory, and coronary events, and explain why ejection requires increased left ventricular pressure.
- Describe diastolic phases, connect ECG, mechanical, auditory, and coronary events in left ventricular diastole, and discuss aortic and left atrial pressure changes during relaxation.
- Discuss arterial kinds, architecture, capillary adaptations for material exchange, pressure, blood storage, anastomoses, and collateral circulation.
- Understand the impact of regulation, pressure, mean arterial pressure, resistance, area, velocity, systemic resistance, and factors on blood volume control.
- Understand substance exchange in blood plasma, fluid movement between capillaries and interstitial spaces, and the roles of hydrostatic and osmotic pressure in edema development.
- Grasp lymphatic system components, vessel organization, lymph dynamics, and the role of primary and secondary lymphatic structures.

- Understand the structure of arteries, veins, and capillaries, explain the system of blood flow through the body, and describe local tissue-level blood flow regulation.
- Define pulse and systolic, diastolic, and pulse pressures, locate where the pulse can be felt, and explain the concepts of tachycardia and bradycardia.
- Comprehend blood pressure regulation, cardiovascular center functions, reflexes, chemoreceptor impact, autoregulation, and circulatory responses to low oxygen.
- Comprehend blood pressure determinants, measurement parameters, blood pressure control, and the role of the Renin-Angiotensin-Aldosterone system in regulation.
- Define hypertension (HTN), recognize its symptoms and signs, grasp the reasons for treating HTN, and be aware of the recommended blood pressure goals.
- Define cardiac output, calculate it, and explain the Frank-Starling law and its significance in cardiac function.
- Define stroke volume, explore its regulation factors, and describe heart rate regulation and autonomic nervous system influence on heart rate.
- Learn venous blood return mechanisms, recognize key systemic veins for deoxygenated blood, and identify azygos vein components.
- Comprehend the cardiovascular impact of long-term exercise, including its effects on lactic acid, respiration, cardiac output, stroke volume, and the benefits of regular exercise.
- Understand cardiac reserve changes in training and heart failure, describe heart failure treatment techniques, explain heart transplant procedures, and outline cardiac assist devices.
- Learn S1 and S2 heart sounds, normal stethoscope placement, normal and abnormal heart and lung sounds, and abnormal sound physiology.
- Discuss circulation physiology, clinical importance and modulation, the blood-brain barrier, hypoxia-induced pulmonary vasoconstriction, and the skeletal muscle pump in venous circulation.
- Understand heart supply-demand, coronary plaque, unstable angina, myocardial infarction, risk factors; define strokes, causes, and types.
- Define shock, delineate its four types, and understand the regulation of the body's response to shock through negative feedback.

Topics/content:**Lectures: (1 hour each)**

- Properties of cardiac muscle
- Action potential in cardiac contractile and conducting muscle
- Cardiac impulse origin and generation
- Conduction defects and Artificial pacemaker
- ECG recording and interpretation
- Vectors & axis deviation
- ECG interpretation in cardiac abnormalities
- Arrhythmias and their mechanism of development
- Cardiac cycle – Systole
- Cardiac cycle – Diastole
- Functional types of blood vessels

- Principles of hemodynamics
- Microcirculation
- Lymphatic system
- Local control of blood flow
- Arterial pulse
- Arterial blood pressure – short term regulation
- Arterial blood pressure – long term regulation
- Hypertension – Types and effects
- Cardiac output
- Factors affecting cardiac output
- Venous return and its regulation
- Cardiovascular changes during exercise
- Cardiac failure
- Heart sounds/murmurs
- Special circulation – Coronary, Splanchnic, Cerebral, Cutaneous
- Ischemic heart disease, cerebrovascular accidents
- Types of heart failure and circulatory shock

Tutorial: (1.5 Hour each)

- Arrhythmias and their mechanism of development
- Cardiac cycle - Diastole
- Arterial blood pressure – long term regulation
- Factors affecting cardiac output

Practical: (1.5 Hour each)

- To record normal human's ECG by using standard bipolar and unipolar chest leads
 - a) To calculate the heart rate by examination of arterial pulse
 - b) To examine the other pulses
 - c) To calculate the target heart rate
- To demonstrate the auscultation of heart sounds using stethoscope or Power Lab
- To record the human blood pressure using sphygmomanometer or Power Lab.

BIOCHEMISTRY**Learning Objectives:**

- Explain the digestion and absorption of lipids.
- Discuss the metabolism of fatty acids, triglycerides, ketone bodies and cholesterol.
- Justify the clinical importance of lipoproteins.
- Discuss various types of hyperlipidemias.
- Interpret lipid profile tests.
- Explain the role of sodium, potassium, and chloride in hypertension.
- Discuss the underlying mechanism of free radical injury.

- Justify the role of nutrition and antioxidants in cardiovascular diseases.
- Interpret the values of cardiac biomarkers.

Topics/content:**Lectures (1 Hour each)**

- Lipids digestion and absorption
- Fatty acids & Triglyceride synthesis
- Fatty Acids Oxidation (Beta Oxidation)
- Ketone body Metabolism
- Cholesterol Metabolism
- Lipoprotein metabolism: Synthesis and functions
- Role of LDL and HDL metabolism in Atherosclerosis
- Role of sodium, potassium & chloride in hypertension
- Oxidants and Antioxidants in radical injury.
- Role of nutrition and antioxidants in cardiovascular disease.

Tutorial: (1.5 Hour each)

- Hyperlipidemias and types
- Lipid Profile and its interpretation
- Sources & biochemical importance of Sodium, Potassium & chloride.
- Interpretation of Cardiac Biomarkers (troponin & isoenzymes).

PATHOLOGY**Learning Objectives:**

- Describe the features of major congenital anomalies of the heart.
- Explain the pathological and clinical features of valvular heart disease.
- Describe the pathophysiology of atherosclerosis and its clinical consequences.
- Explain the pathology and clinical features of hypertension and associated disorders.

Topics/content:**Lectures: (1 Hour each)**

- Congenital anomalies and pathophysiology of congenital heart disease
- IHD and Angina pectoris
- Hypertensive heart Disease
- Hypertensive Vascular Disease

PRACTICALS: (1.5 Hour each)

- Arteriosclerosis, atherosclerosis and IHD
- Hypertensive Vascular Disease
- Differentiate various lesions of vascular disorders

- Lab Investigation Interpretation for Hyperlipidemias

CBLs: (1.5 Hour each)

- Hypertension
- Valvular Heart Disease

PHARMACOLOGY**Learning Objectives:**

- Understand the mechanism of Hypertension and role of different group of drugs that can decrease the blood pressure
- Explain the mechanism of important drugs that can restore the myocardial blood supply and reverse the ischemic state of myocardium
- Know the basic concept of heart failure mechanism and able identify different group of drugs that can improve cardiac activity
- Know only the basic Classification of drugs according to its mechanism as antiarrhythmic drugs

Topics/content:**Lectures: (1 hour each)**

- Over view of drugs used in Hypertension-I
- Over view of drugs used in Hypertension-II
- Drugs used to treat ischemic heart diseases(Angina, Myocardial Infarction)
- Drug treatment of congestive heart failure(CHF)
- Drug treatment of arrhythmias

TUTORIALS: (1.5 hours each)

- Over view of drugs used in Hypertension
- Drugs used to treat angina, myocardial infarction &CHF
- Over view of drugs used to treat arrhythmias

COMMUNITY MEDICINE**Learning Objectives:**

- Discuss the epidemiology of cardiovascular diseases.
- Identify risk factors for common cardiac diseases (hypertension, atherosclerosis, ischemic and rheumatic heart disease, and developmental anomalies of the cardiovascular system) and suggest preventive measures

- Analyze effects of smoking on community

Topics/content:**Lectures : (1 hour each)**

- Cardiovascular diseases and its prevention
- Effect of Smoking on the Community

BEHAVIORAL SCIENCES**Learning Objectives:**

- Basics of medical ethics & its integration into medical practice
- Basic concept of doctor patient relationship & its implementation in clinical setting.
- Conceptual background, theories & assessment of intelligence.

Lectures : (1 hour each)

- Doctor Patient Relationship
- Thinking, metacognition and disorders
- Personality development
- Empowerment

RADIOLOGY**Learning Objectives:**

- Know different views of CXR with appropriate technical factors
- Recognize normal cardiac anatomy on CXR
- Know how different chambers forming left and right borders on CXR
- Able to localize cardiac abnormality on CXR

Lectures : (1 hour)

- Radiological anatomy of CVS on chest x-ray

SKILL LAB**Learning Objectives:**

- Enumerate the steps of examination of cardiovascular system
- To demonstrate correct technique of auscultation of heart.

Topics / Contents: (Small Group / Hands on activity)

- Introduction to cardiovascular system examination

ASSESSMENT

Assessment will be done in two parts:

At the end of module

- Module Exam (Theory) -20%
- Module Exam Practical Internal Evaluation- 20%

At the end of Year

- Annual Exam (Theory) -80%
- Annual Exam (OSPE, Viva)-80%

MCQs (Multiple choice questions), OSPE (Objective Structured Practical Exam) and structured viva will be the main assessment tool.

Learning Resources

S. No	Subject	Readings
1	ANATOMY	<ul style="list-style-type: none"> • Moore KL, Dalley AF. Clinically oriented anatomy. South Asia ed. India. Wolters Kluwer; 2018 Jul 12. • Drake R, Vogl AW, Mitchell AW, Tibbitts R, Richardson P. Gray's Atlas of Anatomy E-Book. Elsevier Health Sciences; 2020 Feb 27. • CLINICAL ANATOMY BY REGIONS (REFERENCE BOOK) Richard S. SNELL 9th EDITION • LAST'S ANATOMY: REGIONAL & APPLIED (REFERENCE BOOK) Chummy S. Sinnatamby 12th or Latest EDITION • ATLAS OF HUMAN ANATOMY FRANK H NETTER 6th EDITION
2	EMBRYOLOGY	<ul style="list-style-type: none"> • LANGMAN'S MEDICAL EMBRYOLOGY T.W. SADLER 13th EDITION • THE DEVELOPING HUMAN CLINICALLY ORIENTED EMBRYOLOGY (REFERENCE BOOK) MOORE & PERSAUD & TORCHIA 10th EDITION
3	HISTOLOGY	<ul style="list-style-type: none"> • MEDICAL HISTOLOGY LAIQ HUSSAIN SIDDIQUI 5TH or Latest EDITION • WHEATERS FUNCTIONAL HISTOLOGY BARBARA YOUNG 5th EDITION • BASIC HISTOLOGY(TEXT AND ATLAS) (REFERENCE BOOK) LUIZ JUNQUEIRA, JOSE CARNEIRO Latest EDITION
4	PHYSIOLOGY	<ul style="list-style-type: none"> • GUYTON AND HALL TEXTBOOK OF MEDICAL PHYSIOLOGY GUYTON AND HALL 13th EDITION
5	BIOCHEMISTRY	<ul style="list-style-type: none"> • LIPPINCOTT'S ILLUSTRATED REVIEWS SERIES DENISE R. FERRIER 6th EDITION • HARPERS ILLUSTRATED BIOCHEMISTRY (REFERENCE BOOK) • VICTOR RODWELL, DAVID BENDER, KATHLEEN M. BOTHAM, PETER J. KENNELLY, P. ANTHONY WEIL 28th EDITION
6	COMMUNITY MEDICINE	<ul style="list-style-type: none"> • PUBLIC HEALTH AND COMMUNITY MEDICINE SHAH, ILYAS, ANSARI 7th EDITION

7	PATHOLOGY	<ul style="list-style-type: none">• ROBBINS BASIC PATHOLOGY KUMAR & ABBAS 9TH EDITION• ROBBINS & COTRAN PATHOLOGIC BASIS OF DISEASE (REFERENCE BOOK) KUMAR & ABBAS & ASTER 9th EDITION
9	PHARMACOLOGY	<ul style="list-style-type: none">• LIPPINCOTT'S ILLUSTRATED REVIEW PHARMACOLOGY KAREN WHALEN 6th or Latest Edition• BASIC AND CLINICAL PHARMACOLOGY (REFERENCE BOOK) BERTRAM G. KATZUNG 11th EDITION
10	BEHAVIORAL SCIENCES	<ul style="list-style-type: none">• Asma Humayun, Introduction to Behavioral Sciences• Atkinson, Hilgard Introduction to Psychology• Haider A Naqvi, Psychology in Practice• Mowadat Hussain Rana, Handbook of Behavioral Sciences

