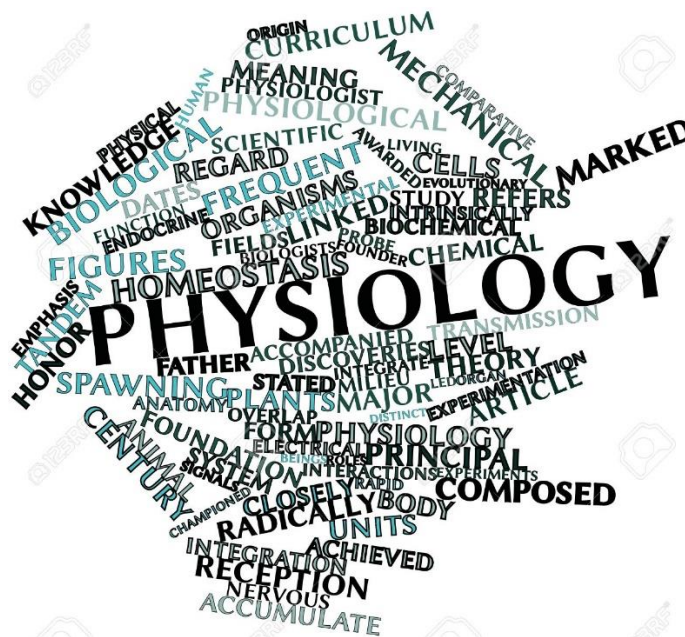




# Study Guide OF PHYSIOLOGY FOR 1<sup>st</sup> PROFF MBBS 2019-2020



**PREPARED BY**

**DR. MUHAMMAD ALI TAHIR**

**MBBS**

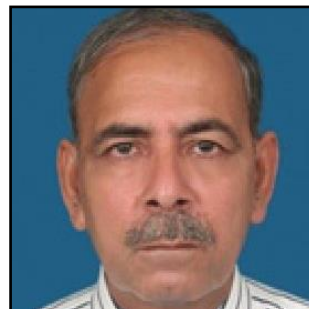
## **MESSAGE FROM PRINCIPAL, AVICENNA MEDICAL COLLEGE**



**PROF. DR. GULFREEH WAHEED**

It is a pleasure to see Avicenna Medical College develop, progress and achieve maximum academic excellence in a short period since its inception in 2009. The institution has lived up to its mission of training and producing medical graduates of international standards. We have achieved several milestones since 2009 including the recognition of our College for FCPS training by College of Physicians and Surgeons of Pakistan (CPSP), establishment of College of Nursing and Avicenna Dental College.

As a Principal I am fortunate to take quick decisions and student friendly measures, yet managing the high standards of Medical Education at the campus. The students at Avicenna are provided with an encouraging environment conducive to their learning and growth and are trained on the pattern test concepts and strategies in Medical Education. They are groomed on modern lines with due emphasis on the highest standards of discipline, Medical Professionalism, Medical and Social ethics in conformity to our cultural and religious values. These attributes along with an inclination towards research and development in academics is the focal point of our education system. Beyond this, we provide students with various opportunities to engage in co-curricular activities thus enabling them to bring out their naturally gifted talent. The student committee and clubs at Avicenna Medical College organize events throughout the academic year which provide an opportunity to the students to enhance their talents and ability for teamwork. As an institution, we feel pride in the fact that we have won the confidence of the parents, who feel satisfied with the conservative yet progressive atmosphere of our Institution, high standards of Medical Education and discipline. Most parents show complete satisfaction once their child joins the 'Avicenna Family'. I welcome the batch of MBBS students to the continuously expanding family of Avicenna Medical College where diligent and devoted faculty members are ready to facilitate eager learners, enabling them to become future professionals and leaders. May Allah bless your endeavors with success and may you bring honors to your Alma Mater. Ameen!

**MESSAGE FROM HOD, PHYSIOLOGY****AVICENNA MEDICAL COLLEGE****Prof. Dr. Binyamin Ahmad****Professor MBBS, M. Phil**

Human physiology seeks to understand the mechanisms that work to keep the human body alive and functioning, through scientific enquiry into the nature of mechanical, physical, and biochemical functions of humans, their organs, and the cells of which they are composed. The principal level of focus of physiology is at the level of organs and systems within systems. The endocrine and nervous systems play major roles in the reception and transmission of signals that integrate function in animals. Homeostasis is a major aspect with regard to such interactions within plants as well as animals. The biological basis of the study of physiology, integration refers to the overlap of many functions of the systems of the human body, as well as its accompanied form. It is achieved through communication that occurs in a variety of ways, both electrical and chemical.

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### **WHAT IS A STUDY GUIDE?**

- ☐ Inform students how student learning program has been organized according to their learning objectives.
- ☐ Help students organize and manage their studies throughout the course.
- ☐ Guide students on assessment methods, rules and regulations

### **THE STUDY GUIDE:**

- ☐ Communicates information on organization and management of the course. 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 course.
- ☐ 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 course 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.

### **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

## **INTRODUCTION TO PHYSIOLOGY DEPARTMENT**

The Department of Physiology entails a huge physiology lab, which has the capacity to seat 60 students, although for effective demonstration and practice, they will be dealt with in batches of 33-34 students. The first portion of the lab represents Cell physiology & body fluids portion, equipped with compound binocular microscopes & centrifuge machines. Next portion, representing blood physiology is provided with Haemocytometers, Sahli's haemoglobinometer, ESR apparatus, teaching and projection microscopes. The lab also provides distillation plant, hot air oven, physical balance & weighing machines. There are educational charts for theoretic reference. A cardio-respiratory portion is equipped with Spirometers, Stethographs, Peak expiratory flow meters, ECG Machines, Sphygmomanometers & Ergometers. The lab is also provided with equipment to test special senses like perimeter, vision charts, fundoscope & tuning forks etc. A couch is placed in the lab for the practice of clinical methods.

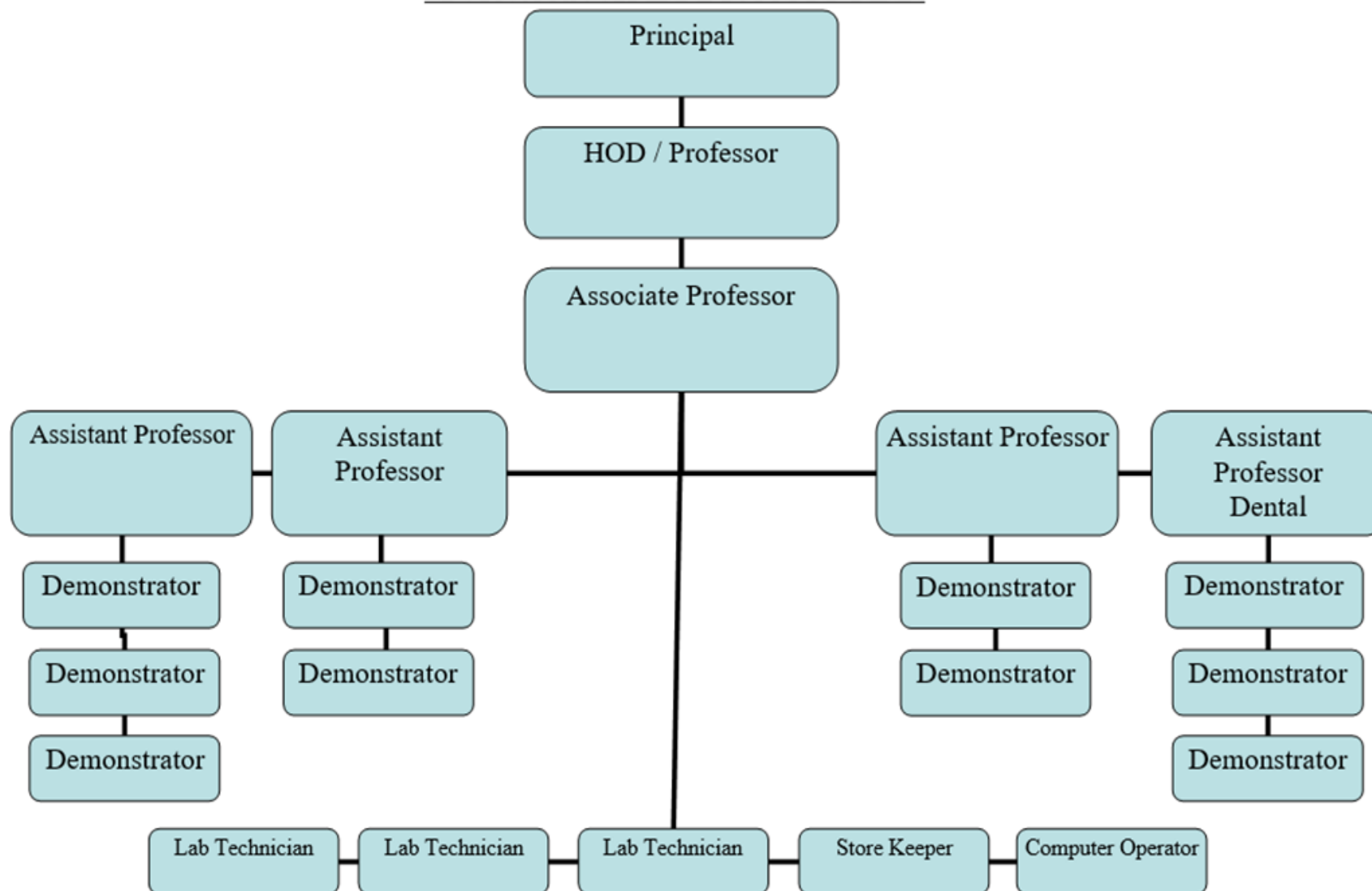
## DEPARTMENTAL GOALS

1. **Demonstrate a knowledge of the major core concepts, theoretical underpinning and empirical findings of Biology (Content Goal)**
  1. *Students will master the core concepts in ecology, physiology, cell physiology, molecular biology, evolution and genetics.*
2. **Understand and apply basic research methods, including experimental design, data analysis and interpretation. (Research Methods Goal)**
  1. *Students will be able to design an experiment and understand its strengths and weaknesses.*
  2. *Students will be able to select an appropriate method to test a hypothesis.*
  3. *Students will be able to conduct a properly controlled experiment.*
  4. *Students will be able to prepare reagents and properly set up equipment to carry out an experiment.*
  5. *Students will be able to collect and analyze data from experiments.*
  6. *Students will be able to use computers to extract information from biologically relevant databases.*
  7. *Students will have a working knowledge of basic scientific equipment to collect and analyze data.*
3. **Understand and apply mathematical approaches to analyze, interpret and model biological processes. (Quantitative Goal)**
  1. *Students will master graphing skills (e.g., scaling and data transformations) for visualizing experimental results.*
  2. *Students are expected to understand mathematical formulas concerning biological concepts and draw inferences from them.*
  3. *Students will understand how numbers are manipulated (e.g., normalization) to yield interpretable results.*
  4. *Students will understand what the terms statistical significance and confidence intervals mean.*
  5. *Students will understand what mathematical modeling of a biological concept means.*
4. **Use critical thinking and reasoning, skeptical inquiry and scientific approach to solve problems. (Critical Thinking Goal)**
  1. *Students will be able to conduct a relevant literature review to create a hypothesis.*
  2. *Students will be able to read and evaluate scientific literature.*
  3. *Students will be able to make connections between diverse facts and observations to develop an understanding of basic core concepts.*

4. *Students will be able to draw appropriate conclusions from experimental results.*
5. **Demonstrate writing and oral communication skills important for communicating scientific ideas. (Communications Goal)**
  1. *Students will communicate experimental results in an understandable manner.*
  2. *Students will demonstrate effective oral presentation skills.*
  3. *Students will collaboratively produce scientific reports from laboratory and or classroom assignments*



## DEPARTMENT OF PHYSIOLOGY





# AVICENNA MEDICAL COLLEGE

AVICENNA MEDICAL COLLEGE									
M-19		1st YEAR	TIME TABLE SESSION 2019 - 2020					WEEK	BASIC
DATE	DAY	8.00-9.00	9.00-10.00	10.00-11.30		11.30-12.00	12.00-1.30		1.30-2.30
	MON	8.00-10.00		10.00-11.30		B R E A K	VIVA	LECTURE GROSS ANATOMY <u>LECTURE HALL 1</u> (12.30- 1.30)	LECTURE BIOCHEMISTRY <u>LECTURE HALL 1</u>
		GRAND TEST EXAMINATION HALL		KEY DISCUSSION & FEED BACK SESSION	TUTORIAL DH GR. ANATOMY/ EMBRYOLOGY PHYSIOLOGY SELF DIRECTED EARNING/ (BIOCHEMISTRY)				
	TUE	LECTURE GEN. EMBRYOLOGY <u>LECTURE HALL 1</u>	LECTURE PHYSIOLOGY <u>LECTURE HALL 1</u>	10:00-11:30			PRACTICAL BATCH A : DH GROSS ANATOMY BATCH B : HISTOLOGY BATCH C : BIOCHEMISTRY BATCH D : PHYSIOLOGY		
				TUTORIAL DH GROSS ANATOMY- BATCH: A PHYSIOLOGY -BATCH: B SELF DIRECTED LEARNING/ (BIOCHEMISTRY) -BATCH: C					
	WED	LECTURE BIOCHEMISTRY <u>LECTURE HALL 1</u>	LECTURE GEN. HISTOLOGY <u>LECTURE HALL 1</u>	10:00-11:30			PRACTICAL BATCH B : DH GROSS ANATOMY BATCH C : HISTOLOGY BATCH D : BIOCHEMISTRY BATCH A : PHYSIOLOGY		
				TUTORIAL DH GROSS ANATOMY- BATCH: B PHYSIOLOGY -BATCH: C SELF DIRECTED LEARNING/ (BIOCHEMISTRY) -BATCH: A					
	THU	8.00-10.00		10:00-11:30			12.00-12.45	12.45-1.30	LECTURE PHYSIOLOGY LECTURE HALL 1
		GRAND TEST <u>EXAMINATION HALL</u>		TUTORIAL DH GROSS ANATOMY- BATCH:C PHYSIOLOGY -BATCH:A SELF DIRECTED LEARNING/ (BIOCHEMISTRY) -BATCH: B			LECTURE SURGERY (33 LEC) RADIOLOGY & ORTHO (7 LEC) LECTURE HALL 1	LECTURE PATHOLOGY (20 LEC)/ OBG ( 13 LEC) / EYE (7 LEC) <u>LECTURE HALL 1</u>	
	FRI	LECTURE PHYSIOLOGY <u>LECTURE HALL 1</u>	LECTURE GROSS ANATOMY <u>LECTURE HALL 1</u>	10:00-10:45	10:45-11:30	11.30-1:00			
				LECTURE MEDICINE (33+5 LEC) <u>LECTURE HALL 1</u>	LECTURE GEN. EMBRYOLOGY LECTURE HALL 1	PRACTICAL BATCH C : DH GROSS ANATOMY BATCH D : HISTOLOGY BATCH A : BIOCHEMISTRY BATCH B : PHYSIOLOGY			
	SAT	LECTURE PHYSIOLOGY <u>LECTURE HALL 1</u>	LECTURE BIOCHEMISTRY <u>LECTURE HALL 1</u>	10:00-10:45	10.45-11.30	11.30-12.00	PRACTICAL BATCH D : DH GROSS ANATOMY BATCH A : HISTOLOGY BATCH B : BIOCHEMISTRY BATCH C: PHYSIOLOGY		LECTURE GENERAL ANATOMY/ GROSS ANATOMY <u>LECTURE HALL 1</u>
				LECTURE COM. MEDICINE (33 LEC)/ ENT (7 LEC) <u>LECTURE HALL 1</u>	LECTURE ISLAMIYAT/ PAK STUDIES (24 LEC)/ BEH.SCIENCES (7 LEC)/ PAEDS (7 LEC) <u>LECTURE HALL 1</u>	B R E A K			

Prepared by \_\_\_\_\_

Principal  
Prof.Dr.Gulfreem Waheed\_\_\_\_\_



# DEPARTMENT OF MEDICAL EDUCATION

Subject: Physiology - 1st Yr MBBS

TABLE OF SPECIFICATION

PMDC Requirement =

Date: 18th Nov. 2019

AVICENNA Curriculum Hour =

Sr. No.	Topic	LEARNING OBJECTIVES	KNOWLEDGE			SKILL	ATTITUDE	TOTAL	Mode of information transfer				TOTAL HOURS	Lecture Topics	References	Practicals
			Cognitive Domain			Psychomotor Domain	Effective Domain	%	MIT							
			C1	C2	C3	P	A		Lecture	Tutorial	Practical	Clinical Rotation	Hour			
1	Basic and Cell Physiology	Student will be able to:	1%	2%	1%	1%		5%	14 hours	4.5 hours	1.5 hour	20 hours  3 weeks		Guyton ed 13, ch. 1 Ganong ed 25, ch. 1	Use of Compound Microscope: Examination of Hair, Buccal Cells, Air Bubbles, Fat Globules, Sand Particles, Wool Fibre, Cotton Fibre	
		1. Describe the functional organisation of Human Body											1. Functional organisation of Human Body 2. Homeostasis: Internal Environment 3. Control systems of the body			
		2. Explain the concepts of Homeostasis														
		3. Describe the various control system of the body with clinical relevance											4. Structure of the Cell, Cell Membrane and its functions			
		4. Describe and draw the structure, functions of cell membranes and intercellular connections														
		5. Describe the structure and functions of cell organelles, and compare their functional characteristics														
		6. Describe and compare the transport mechanisms through cell membrane														
		7. Explain the genetic components of the body, their control and functions, with clinical correlations.											Guyton ed 13, ch. 2 Ganong ed 25, ch. 2			
	Guyton ed 13, ch. 3 Ganong ed 25, ch. 1															





4	Heart	Student will be able to:															
		1. Describe the structure and function of the conduction system of the heart and compare the action potentials in each part.															1. ECG 1
		2. Describe the way the electrocardiogram (ECG) is recorded, the waves of the ECG, and the relationship of the ECG to the electrical axis of the heart.															2. ECG 2
		3. Name the common cardiac arrhythmias and describe the processes that produce them.															
		4. List the principal early and late ECG manifestations of myocardial infarction and explain the early changes in terms of the underlying ionic events that produce them.															
		5. Describe the ECG changes and the changes in cardiac function produced by alterations in the ionic composition of the body fluids.															
		6. Describe how the sequential pattern of contraction and relaxation in the heart results in a normal pattern of blood flow.															
		7. Understand the pressure, volume, and flow changes that occur during the cardiac cycle.	1%	3%	2%	2%	1%	9%	18 hours	9 hours	3 hours	30 hours	1. Physiologic Anatomy of Cardiac Muscle, Cardiac Muscle as a Syncytium, Heart chambers, nerve and blood supply of heart, Properties of myocardium--- Action Potentials in Cardiac Muscle, Contractility	Guyton ed 13, ch. 9 Ganong ed 25, ch. 30			
		8. Explain the basis of the arterial pulse, heart sounds, and murmurs.											2. Action potentials in cardiac muscle; Excitation-Contraction Coupling				
		9. Delineate the ways by which cardiac output can be upregulated in the setting of specific physiologic demands for increased oxygen supply to the tissues, such as exercise.											3. Cardiac Cycle: Pressure and Volume Changes in the Ventricles				
		10. Describe how the pumping action of the heart can be compromised in the setting of specific disease states.											4. Cardiac Cycle: Heart Sounds, ECG Changes, Atrial Waves				
													5. Regulation of Contraction of Ventricular Muscle				
													6. Effect of Different Ions on Heart Function				
													7. Rhythmical Excitation of the Heart: Rhythmicity, Conductivity and excitability, Specialized conducting system of heart	Guyton ed 13, ch. 10 Ganong ed 25, ch. 29			
													8. Excitation and action potential in pace maker				
													9. Transmission of the Cardiac Impulse Through Atria, AV Nodal Delay				
													10. Conduction Through Ventricles, Abnormal Pacemaker, Control of Heart Rhythmicity and Impulse Conduction				
													11. Electrical properties of cardiac muscle (Normal ECG recording and interpretation)	Guyton ed 13, ch. 10 Ganong ed 25, ch. 30			
													12. Electrical properties of cardiac muscle (Normal ECG recording and interpretation)—II Methods of recording ECG				
													13. ECG Leads				
													14. Abnormal ECG				
													15. Arrhythmias -1(Mechanism of Arrhythmias)				
													Abnormal Sinus Rhythms				
													16. Abnormal Rhythm Resulting from Heart Blocks				
													17. Premature Contractions, Paroxysmal Tachycardia, Ventricular Fibrillation				
													18. Atrial Fibrillation, Atrial Flutter, Cardiac Arrest				

## Circulation

[illegible]







[illegible]

Respiration	9. List the important factors affecting the affinity of hemoglobin for O <sub>2</sub> and the physiologic significance of each. 10. List the reactions that increase the amount of CO <sub>2</sub> in the blood, and draw the CO <sub>2</sub> dissociation curve for arterial and venous blood.																		10. Physics of Gas Diffusion and Gas Partial Pressures Laws of gas diffusion		
	11. Define alkalosis and acidosis and list typical causes and compensatory responses to each.	2%	4%	7%	3%	3%	19%	32 hours	6 hours	9 hours									11. Compositions of Alveolar Air and Atmospheric Air		
	12. Define hypoxia and describe differences in subtypes of hypoxia.																		12. Respiratory Membrane Factors That Affect the Rate of Gas Diffusion through the Respiratory Membrane Diffusing Capacity of the Respiratory Membrane Measurement of Diffusing Capacity-the Carbon Monoxide Method	Guyton ed 13, ch. 40 Ganong ed 25, ch. 35	
	13. Describe the effects of hypercapnia and hypocapnia, and give examples of conditions that can cause them.																		13. Effect of the Ventilation-Perfusion Ratio on Alveolar Gas Concentration Concept of Physiologic Shunt Concept of the Physiologic Dead Space Abnormalities of Ventilation-Perfusion Ratio		
	14. Locate the pre-Bötzinger complex and describe its role in producing spontaneous respiration.																		14. Transport of Oxygen from the Lungs to the Body Tissues		
	15. Identify the location and probable functions of the dorsal and ventral groups of respiratory neurons, the pneumotaxic center, and the apneustic center in the brainstem.																		15. Role of Hemoglobin in Oxygen Transport (Oxygen-Hemoglobin Dissociation Curve) Effect of Hemoglobin to "Buffer" the Tissue PO <sub>2</sub>	Guyton ed 13, ch. 41 Ganong ed 25, ch. 35	
	16. List the specific respiratory functions of the vagus nerves and the respiratory receptors in the carotid body, the aortic body, and the ventral surface of the medulla oblongata.																		16. Factors That Shift the Oxygen-Hemoglobin Dissociation Curve Transport of Oxygen in the Dissolved State		
	17. Describe and explain the ventilatory responses to increased CO <sub>2</sub> concentrations in the inspired air.																		17. Transport of Carbon Dioxide in the Blood Carbon Dioxide Dissociation Curve		
	18. Describe and explain the ventilatory responses to decreased O <sub>2</sub> concentrations in the inspired air.																		18. Combination of Hemoglobin with Carbon Monoxide-Displacement of Oxygen Respiratory Exchange Ratio	Guyton ed 13, ch. 42 Ganong ed 25, ch. 36	
	19. Describe the effects of each of the main nonchemical factors that influence respiration.																		19. Nervous control of respiration Respiratory Center- Herring Bruer inflation reflex		
	20. Describe the effects of exercise on ventilation and O <sub>2</sub> exchange in the tissues.																		20. Chemical Control of Respiration		
	21. Define periodic breathing and explain its occurrence in various disease states.																		21. Peripheral Chemoreceptor System for Control of Respiratory Activity; Role of Oxygen in Respiratory Control Regulation of Respiration during Exercise	Guyton ed 13, ch. 43 Ganong ed 25, ch. 35	
																			22. Factors affecting respiration Periodic breathing Cheyne Stokes breathing		
																			23. Pulmonary function tests: Useful Methods for Studying Respiratory Abnormalities		
																			24. Pathophysiology of Specific Pulmonary Abnormalities 25. Emphysema Asthma		
																			26. Hypoxia and Oxygen Therapy; Effects of Hypoxia on the Body; Cyanosis		
																			27. Hypercapnia-Excess Carbon Dioxide in the Body Fluids; Artificial Respiration		



## CURRICULUM & LEARNING OUTCOMES WITH REFERENCE TO UHS

At the end of the course the student should be able to:

### Basic and Cell Physiology

1. Understand functional organization of human body
2. Describe homeostasis / control systems in the body
3. Describe *structure*, functions of cell membrane and its transport mechanisms
4. List cell organelles and describe their functions
5. Understand basic concepts about DNA and RNA

### Blood

1. Describe the composition and general functions of blood
2. Enumerate plasma proteins, give their properties, their sites of production and explain their functions
3. Explain erythropoiesis and factors affecting erythropoiesis
4. Explain the functions of red blood cell
5. Understand the structure; describe functions of hemoglobin and enumerate its different types.
6. Describe the role of various elements especially iron in hemoglobin synthesis.
7. Enumerate and define various blood indices
8. Explain leucopoiesis and describe types and functions of white blood cells
9. Describe monocyte-macrophage system and functions of spleen
10. Explain various types of immunity
11. Explain thrombocytopoiesis and describe functions of platelets
12. Explain hemostasis, mechanism of blood coagulation, fibrinolysis and anticoagulants
13. Explain the blood groups and their role in blood transfusion
14. Understand fate of red blood cells and bilirubin formation

### Applied Physiology

Understands:

1. Anemia, its types and the effects on human body
2. Polycythemia, its types and effects on the human body

3. Blood indices in various disorders
4. Clotting and bleeding disorders
5. Hazards of blood transfusion
6. Rh incompatibility
7. Abnormal immune responses
8. Jaundice

## **Nerve and Muscle**

1. Understand the *structure of the neuron* and describe the properties of nerve fibres
2. Classify the nerve fibres
3. Describe the physiological basis of resting membrane potential
4. Describe the genesis of action potential and compound action potential
5. Describe the propagation of action potential
6. Outline the structural-functional relationship of skeletal muscle
7. Describe neuromuscular junction and transmission
8. Explain and compare the mechanism and characteristics of contraction of the three muscle types.
9. Differentiate between the isometric and isotonic contraction
10. Understands the difference between tetany and tetanization
11. Excitation contraction coupling
12. Understand chemical changes during muscle contraction and muscle fatigue

## **Applied Physiology**

Understands:

1. Peripheral nerve injuries
2. Myasthenia gravis
3. Muscular dystrophy
4. Muscular hypertrophy / atrophy
5. Rigor mortis / contracture
6. Drugs / poisons affecting neuromuscular junctions

## **Cardiovascular System**

1. Describe scheme of circulation through the heart and body
2. Describe the properties of cardiac muscle
3. Explain the generation of cardiac impulse and its conduction

4. Compare and contrast action potential of SA node and ventricular myocardium
5. Describe the various events in cardiac cycle
6. Explain the mechanism for production of heart sounds
7. Describe the lead systems for a 12 lead ECG
8. Define, draw and label normal ECG and explain the physiologic basis of waves, segments and intervals
9. List types of blood vessels and their function
10. Describe the haemodynamics of blood flow (local control systemic circulation its regulation and control)
11. Explain the microcirculation and capillary dynamics.
12. Discuss peripheral resistance its regulation and effect on circulation
13. Describe the arterial pulse
14. Define venous return and explain the factors affecting it.
15. Explain cardiac output and its control
16. Describe blood pressure and its regulation
17. Describe coronary circulation and factors affecting it
18. Describe the factors regulating cerebral and cutaneous circulations
19. Define shock and its various types with their physiological / pathophysiological basis
20. Describe the various stages of shock and their physiological compensation.

### **Applied Physiology**

#### **Understands:**

1. Basic concepts related to electrical axes and cardiac vectors
2. Differentiation between various ECG recordings on the basis of rate and rhythm (bradycardia, tachycardia, heart-blocks, ventricular fibrillation, atrial fibrillation, myocardial ischemia / infarction)
3. Development of Oedema
4. Effects of hypertension and cardiac failure
5. Clinical significance of heart sounds and murmurs
6. Varicose veins

### **Respiratory System**

1. Describe the functional organization of the respiratory tract.
2. Describe respiratory and non-respiratory function of the respiratory tract
3. Explain the mechanics of breathing



4. Describe the production & function of surfactant and compliance of lungs
5. Describe the protective reflexes
6. Explain lung volumes and capacities including dead space
7. Describe pulmonary circulation and pulmonary capillary dynamics
8. Describe the composition of atmospheric, alveolar and expired air
9. Describe the diffusion of gases across the alveolar membrane
10. Explain the relationship between ventilation and perfusion
11. Describe the mechanism of transport of oxygen and carbon dioxide in blood
12. Describe the nervous and chemical regulation of respiration
13. Explain abnormal breathing
14. Define and explain hypoxia, its causes and effects
15. Define and explain cyanosis, its causes and effects

### **Applied Physiology**

Understands:

1. Causes of abnormal ventilation and perfusion
2. Effects of bronchial asthma, pneumothorax, pleural effusion and pneumonia
3. Respiratory failure
4. Artificial respiration and uses & effects of O<sub>2</sub> therapy
5. Clinical significance of hypoxia, asphyxia, cyanosis, and dyspnoea
6. Respiratory distress syndrome
7. Differentiation between obstructive and restrictive lung disorders on the basis of pathophysiology and lung function test
8. Respiratory acidosis and alkalosis.

### **Skin and Body Temperature Regulation**

1. Describe body temperature regulation
2. Describe functions of skin

### **Applied Physiology**

Understands:

Abnormalities of temperature regulation

**Human Responses in Varied Environments:**

1. Describe cardiovascular, muscular and respiratory adjustments in exercise
2. Explain physiologic responses to high altitude and space
3. Explain physiologic responses to deep sea diving and hyperbaric conditions

**Applied Physiology**

1. Acute and chronic mountain sickness
2. Nitrogen narcosis and decompression sickness

## **PHYSIOLOGY PRACTICALS**

### **Haematology**

1. Use of the microscope
2. Determination of haemoglobin
3. Osmotic fragility of RBCs
4. Blood groups
5. Determination of erythrocyte sedimentation rate
6. Determination of packed cell volume
7. Determination of bleeding and clotting times
8. RBC count
9. Platelet count
10. Red cell indices
11. Total Leukocyte count
12. Differential leucocyte count

### **Respiratory System**

1. Clinical examination of respiratory system
2. Pulmonary volumes, capacities and their clinical interpretation
3. Recording of respiratory movements using Stethograph

## **Cardiovascular System**

1. Cardiopulmonary resuscitation (to be coordinated with the department of medicine)
2. Examination of arterial pulse
3. Examination of jugular venous pulse
4. ECG recording and interpretation of normal ECG
5. Recording of arterial blood pressure
6. Effects of exercise and posture on blood pressure
7. Apex beat and normal heart sounds
8. Triple response
9. ICU / CCU / Medical ward visit to study the cases of CCF, Murmurs, Hypertension, Myocardial infarction etc.

## **Skin and body temperature regulation**

Recording of body temperature

## **Demonstration of power lab (computerized data acquisition system) related experiments**

## **SOURCE OF KNOWLEDGE**

### **RECOMMENDED BOOKS**

1. **Textbook of Physiology** by Guyton and Hall, Latest Ed.
2. **Review of Medical Physiology** by William F. Ganong, Latest Ed.

### **REFERENCE BOOKS**

1. **Human Physiology** by Laurali Sherwood
2. **Physiology** by Berne and Levy, Latest Ed.
3. **Essentials of Medical Physiology** by Prof. Dr. Mushtaq Ahmad
4. **Physiology** by Linda and Constanzo

# POLICY & GUIDELINES OF

## LEARNING STRATEGIES & STUDY SKILLS FOR MEDICAL

### STUDENTS

*This document is a Summary written for the purpose of the study guides. For details refer to the document "A HANDBOOK OF POLICY & GUIDELINES OF LEARNING STRATEGIES & STUDY SKILLS FOR MEDICAL STUDENTS" available for the students at website, Bookshop and the Department of Medical Education.*

#### **STEPS TO STRATEGIC LEARNING:**

##### **1. Set realistic learning goals.**

These goals serve as the driving force to generate and maintain the motivation, thoughts, and behaviour necessary to succeed. Set and use long-term occupational goals (you want to be a doctor) and short-term learning goals (you want to understand this new material).

##### **2. Types of knowledge needed to be a strategic learner:**

- Know yourself as a learner (learning preferences, talents, best times of day to study, ability to match study skills to learning task) this knowledge helps you set realistic yet challenging learning goals.
- Knowing the nature and requirements of different types of educational tasks.
- Knowing a variety of study skills and learning strategies and how to use them.
- Knowing the contexts in which what is being learned can be used now or in the future.

##### **3. Use a variety of learning strategies:**

- Manage your study environment,
- Coordinate study and learning activities,
- Keep your motivation for learning clear,
- Generate positive behaviours toward learning,
- Make new information meaningful to you,
- Organize and integrate new information with existing knowledge, or Re-organize existing knowledge to fit the new understanding and information.
- Place new information in a present or future context.

## ACADEMIC HOURS BREAKDOWN AS PER PMDC REGULATIONS

**TABLE OF SPACING AND HOURS OF SUBJECTS IN MBBS COURSE**

SUBJECT	1 <sup>st</sup> year	2 <sup>nd</sup> year	3 <sup>rd</sup> year	4 <sup>th</sup> year	5 <sup>th</sup> year	Total Hours
BEHAVIOURAL SCIENCES	5 Hrs.	5 Hrs. 5 Hrs.	5 Hrs.	5 Hrs.		25 Hrs.
ISLAMIC & PAKISTAN STUDIES	15 Hrs.	15 Hrs. 10 Hrs.	10 Hrs.	-		50 Hrs.
ANATOMY	250 Hrs.	250 Hrs.	-	-	-	500 Hrs.
PHYSIOLOGY	250 Hrs.	250 Hrs.	-	-	-	500 Hrs.
BIOCHEMISTRY	100 Hrs.	100 Hrs.	-	-	-	200 Hrs.
PHARMACOLOGY	-	-	300 Hrs.	-	-	300 Hrs.
PATHOLOGY	15 Hrs.	25Hrs.	260 Hrs	200 Hrs	-	500 Hrs.
* FORENSIC MEDICINE	-	-	100 Hrs	-	-	100 Hrs.
** COMMUNITY MEDICINE	25 Hrs	25 Hrs	50 Hrs	150 Hrs	-	250 Hrs.
MEDICINE & Allied	25 Hrs.	30 Hrs.	120 Hrs	265 Hrs.	360Hrs	800 Hrs.
NUCLEAR MEDICINE	-	10 Hrs.	-	10 Hrs	-	20 Hrs.
EMERGENCY MEDICINE	-	-	-	-	-	-
MEDICINE ELECTIVE, *** PSYCHIATRY, DERMATOLOGY AND GENERAL PRACTICE	-	-	-	-	-	-
PAEDIATRIC MEDICINE	5 Hrs.	10 Hrs.	15 Hrs	50 Hrs	70 Hrs	150 Hrs.
SURGERY & ALLIED	25 Hrs.	30 Hrs.	120 Hrs	265 Hrs	360 Hrs	800 Hrs.
**** RADIOLOGY ORTHOPAEDICS, PAED.SURGERY, NEUROSURGERY, SURGERY ELECTIVE, EMERGENCY SURGERY & ANAESTHESIA	5 Hrs.	10 Hrs.	-	10 Hrs	15 Hrs	40 Hrs.
OBSTETRICS & GYNAECOLOGY	10 Hrs.	10 Hrs.	50 Hrs	100 Hrs	130 Hrs.	300 Hrs.
OPHTHALMOLOGY	5 Hrs.	10 Hrs.	15 Hrs	70 Hrs	-	100 Hrs.
OTORHINOLARYNGOLOGY(E.N.T.)	5 Hrs.	10 Hrs.	15 Hrs	70 Hrs	-	100 Hrs.
CLINICO-PATHOLOGICAL CONFERENCE	-	-	-	60 Hrs	-	60 Hrs.
Total	740 Hrs	790 Hrs	1060 Hrs	1265Hrs	940Hrs	4795Hrs

- \* Bioethics will be taught in the Forensic Medicine.
- \*\* Biostatistics will be taught in Community Medicine.
- \*\*\* Behavioral Sciences will be taught in Psychiatry.
- \*\*\*\* Biophysics will be taught in Radiology.



**Distribution of subjects Instructional contents into Theory and Practical learning.**

Type of subject	Theory Content	Practical Skills Content
All Basic Sciences	50%	50%
Pre-Clinical Sciences (Pharmacology and Therapeutics, Forensic Medicine, Community Medicine, Pathology)	40%	60%
Clinical Sciences	30%	70%
Internship/House Job	0%	100%

**Time Allocation To Curriculum Content= 7493 hours**

Subject specified competencies	General competencies
80% 5994	20% 1499

**Time Allocation To the Study Design(5184)**

Instructions	Self Study
80% 4795	20% 1198

**Time Allocation to Site of Study(4147)**

Institution Based	Community Oriented
80% 3836	20% 959

**Distribution of Marks in Evaluation**

University Examination	Internal Assessments
90%	10%

**Examination of Subject Based MBBS Curriculum**

Total 100%

Internal Assessment 20%

University Examination 80%

Internal Assessment Theory	Internal Assessment Practical	University Assessment Theory	University Assessment Practical	Total
10%	10%	40%	40%	100%

**Generic Competencies**

Total Hours = 1499

**Compulsory**

- Pakistan Studies
- Islamiyat



## ACADEMIC HOURS BREAKDOWN (ACMC)

CURRICULUM						
1ST YEAR MBBS M-19 ACADEMIC YEAR 2020						
S#	Subjects	PMDC Req. Study Hours	Lecture Hours	Tutorial Hours	Practical Hours	TOTAL STUDY HOURS
1	ANATOMY	250/ 503.5	1.5 x38= 57 45min x 38.5= 28.5 190+57+28.5= 275.5	1.5 x38= 57 57 x 2= 114	1.5 x 38= 57 57 x 2= 114	503.5
2	PHYSIOLOGY	250/304	5 x38= 190	1.5 x 38= 57 57 x 1=57	1.5 x 38= 57 57 x 1=57	304
3	BIOCHEMISTRY	125/171	3 x 38= 114	1.5 x 20= 30	1.5 x 18= 27	171
4	ISLAMIYAT/ PAK. STUDIES	15/ 18	45 min x 24= 18	0	0	18
5	BEH. SCIENCES	5/5	45 min x 7= 5.25	0	0	5
6	PATHOLOGY	15/ 15	45 min x 20= 15 hrs	0	0	15
7	COM.MEDICINE	25/ 25	45min x 38= 28.5	0	0	25
8	MEDICINE & ALLIED	25/ 28.5	45min x 38= 28.5	0	0	28.5
9	PAEDS	5/5	45min x 7 = 5 hrs	0	0	5
10	SURGERY & ALLIED	25 / 25	45min x 33= 25	0	0	25
11	RADIOLOGY & ORHO	5/5	45min x 7=5 hrs	0	0	5
12	OBG	10/10	45min x 13=10 hrs	0	0	10
13	EYE	5/5	45min x 7=5 hrs	0	0	5
14	ENT	5/5	45min x 7=5 hrs	0	0	5
15	SELF DIRECTED LEARNING (SDL)	500 IN 5 YEAR	0	1.5 x38= 57	0	57
	<b>TOTAL HOURS:</b>	<b>765/1182</b>	<b>729.75</b>	<b>258</b>	<b>198</b>	<b>1182 hrs</b>

## UHS TABLE OF SPECIFICATIONS

Topic / Chapter	No. of MCQs	No. of SEQs
Basic and Cell Physiology	02	01
Blood	09	02
Nerve and Muscle	09	02
Skin and Temperature Regulation	02	0.5
Cardiovascular System	14	02
Respiratory System	07	01
Human Responses in Varied Environments	02	0.5
<b>Total</b>	<b>45</b>	<b>09</b>

## Objectively Structured Performance Evaluation (OSPE)

(Total Marks: 90)

The structure of OSPE/ Practical/ Viva should be as follows:

➤ **Viva Voce (35 marks)**

- Internal ----- 15 marks
- External ----- 20 marks

➤ **OSPE (25 marks)**

- Non-observed stations      10 of 01 marks each (2 minutes each)
- Observed stations              03 of 05 marks each (4 minutes each)

30% C1	}	OSPE
40% C2		
30% C3		

➤ **Practical (30 marks)**

- Practical                              20 marks
- Procedure Writing                  05 marks
- Yearly Workbook Assessment    05 marks

## **INTERNAL ASSESSMENT POLICY**

The assessment policy of Avicenna Medical College clearly reflect that the assessment must covers knowledge, skills and attitude to be acquired by a medical student at the end of the each Professional Year and the entire MBBS Course.

- Theoretical knowledge is assessed by means of MCQs, SEQs, Structured Viva, CBD Tutorials and Pre-Test Tutorials.
- Professional and Clinical Skills are assessed through OSPE, OSCE, Practical Exams and Long and Short Cases.
- Attitudes are assessed through OSPE, OSCE, Practical Exams, Long Cases, Short Cases and Vivas

### **Assessment Procedures**

Performance of students will be assessed as follows:

#### **a. Programmatic Assessment During Academic Year: Grand Tests and Revision Test**

It will incorporate both formative and summative assessment for all academic years.

##### **1) Formative Assessments:**

These are Conducted throughout the academic year. These are low stake examinations with feedback to improve student learning, leading to better performance in summative assessments and the UHS Professional Examinations. At Avicenna Medical College the formative assessment is in the form of Grand Tests, Revision Tests, Research, Tutorials, Assignments, Long Cases and Short Cases presentations etc.

##### **2) Summative Assessments:**

These are conducted at the end of each term, consisting of Session Examinations conducted on the pattern of UHS annual Prof Exams. These consist of One best type of MCQs and SEQs which has two to three parts require written short essay responses from the students. The MCQs, the SEQs are mostly clinical and scenario based and designed to test the concepts.

#### **b. End of Term Assessment**

This will be summative carried out at the end of each academic year.

### **Assessment Tools:**

Various tools selected are as follows according to UHS guidelines.

#### **a. Written Assessment**

##### **1) Multiple Choice Question (MCQ)**

MCQs are extensively used for in both formative and summative assessment owing to their ability to offer a broad range of examination items that incorporate several subject areas. They are the one best type of MCQs and designed to test factual knowledge, understanding and clinical reasoning.

A multiple choice item consists of a problem, known as the stem, and a list of suggested solutions, known as the choices. The choices consist of one correct or best choice, which is the

answer, and incorrect or alternatives, known as distractors. Each MCQ carries one mark. The number of MCQs vary in the Grand Tests, Revision Test and the Session Exams as needed.

## 2) Short Essay Questions (SEQs)

Written assessment formats are the most widely used assessment methods in medical education. Learning outcomes which are mainly based on cognitive domains (knowledge) can be assessed by them.

The SEQs have a statement or clinical scenario followed by two to three questions, which require application of concepts and are thought provoking.

## b. Assignments and Presentations

Every month in various departments, topics of clinical significance are given to the students for assignment and presentations for small group discussions (SGD) sessions. These will be a part of formative assessment. Clinico- Basic and Clinico-Pathological Conferences (CPC) are held for preclinical and clinical years, respectively.

## c. Practical/Clinical Assessment

### 1) Objective Structured Practical Exam (OSPE)

A formative OSPE will be held during terms and summative at the end of year. It will consist of laboratory-based and practical questions related to the learning objectives covered in the course. The students will be given feedback after formative assessment.

### 2) Objective Structured Clinical Exam (OSCE):

A formative OSCE will be held during the term and summative at the end of year. It will consist of clinical and practical questions related to the learning objectives covered in the course. The students will be given feedback after formative assessment.

### 3) Long Case

At the end of fourth and final year each subject will be assessed by a long case. Daily encountered problems will be the case scenarios for which students will be trained during formative assessment in clinics.

### 4) Structured Viva

At the end of examination an integrated viva will be taken in which relevant specialists will sit and ask questions. There will be guidelines for examiners to follow.

### 5) Log Books

In case of log books, required entries will be countersigned by observer. It will be criterion referenced whereas the students will have to fulfill the following criteria: for example assignments, case presentations in wards, departmental log books.

### 6) Observation

#### Internal Assessment

The progress report from teachers will have separate column about behavior and attitude of students in each term in addition to academic record with minimum pass of 50%.

## Internal Assessment

The progress report from teachers will have separate column about behavior and attitude of students in each term in addition to academic record with minimum pass of 50%.

The question papers are prepared in secrecy and approved by the Principal. The department then gets sufficient copies made in secrecy and submits the same to the directorate of Medical Education 24 hours before the scheduled test / exam. On the day of the examinations these papers along with the answer sheets are collected from the DME and taken straight to the examination hall where they are opened and are distributed to the students for attempting the question.

After the papers have been solved, the MCQs are marked immediately and the SEQs marked and submitted within two days (except for revision tests where the results have to be submitted within 24 hours) from here, the assessment system as envisaged in the earlier paragraphs is applied.

Every test / examination is supported by keys both for MCQs and SEQs. Adequate time is air marked for key discussion in which the member of the faculty explains to the class how in fact they should have attempted the MCQs and SEQs. This gives an opportunity to the class to make the assessment of how they have attempted the paper and what mistakes they have made and how not to repeat them in future.

Avicenna Medical College endeavors to implement the assessment system of the UHS subject based curriculum as it is in vogue at present by implementing the curriculum with the basic ingredients of assessment implementation as follows:

- a. Grand Test
- b. Revision Test
- c. Session Examinations
- d. OSPE
- e. OSCE
- f. Viva
- g. Log books / Copies
- h. Assignments
- i. Research work
- j. Tutorials
- k. Long case
- l. Short case

### **Practical Assessments**

The regulations for the preparation and conduct of practical assessments vary between subject areas. Where regulations have not been specified they have to be put up to the Academic Committee.

### **Clinical Assessment**

The clinical assessment is carried out in the following forms:

- a. Scenario based Clinical Oriented MCQs
- b. Scenario/Clinical based SEQs/SAQs
- c. On-Patient training viva
- d. Ward tests

- e. OSPE
- f. OSCE

### Assessment Framework

The framework for assessment involves the University guideline of:

- a. Pass marks 50%
- b. Equal marks for theory and for practical
- c. Internal Assessment 10% to be awarded by the college
- d. Allocation of marks as under

### Allocation of Marks

Sr.	Subject	Marks Theory	Marks Practical / OSPE / OSCE	Remarks
1	Anatomy	100	100	Internal assessment 10%
2	Physiology	100	100	Internal assessment 10%
3	Biochemistry	100	100	Internal assessment 10%
4	Islamiyat & Pak Studies	100	-	
5	Pathology	150	150	Internal assessment 10%
6	Pharmacology	150	150	Internal assessment 10%
7	Forensic Medicine	100	100	Internal assessment 10%
8	Community Medicine	150	150	Internal assessment 10%
9	Special Pathology	150	150	Internal assessment 10%
10	ENT	100	100	Internal assessment 10%
11	Ophthalmology	100	100	Internal assessment 10%
12	Medicine	200	300	Internal assessment 10%
13	Surgery	250	250	Internal assessment 10%
14	Gynae	150	150	Internal assessment 10%
15	Paeds	100	100	Internal assessment 10%
16	Behavioral Sciences	100	100	Internal assessment 10%

**Grand Test:** The syllabus of each subject for which the table of specification has been formulated in detail is divided into various topics and grand tests are held after the topic has been covered in theory, practical and in tutorial classes. The grand test is the first exposure of the students towards assessment of his/her knowledge and skills and is held once only for each topic covered as the syllabus goes along. The grand test has the following ingredients:

- a. MCQs                                      45% marks
- b. SEQs                                        45% marks
- c. Viva / Copy                                10% marks

**Note:** The DME maintains a record of all grand tests along with the keys to the MCQs and SEQs and the results. These results are used for the calculation and assessment of each student in terms of their acquisition of knowledge and skills.

**Revision Test:** The revision tests are designed to precede every session exam and they are aimed at breaking up the syllabus and covering the same in small bits so that the students can have exhaustive study of the portion of the syllabus to be tested upon. The schedule of revision test is decided jointly by the Assessment Committee and the students' class representatives so that the student input is brought into consideration. In this case the students' representatives include the weak students, the average ones and good students. And this mix ensures that adequate time is provided to weak students to do exhaustive studies.

Depending upon the syllabus covered. 8 to 10 revision tests are held in preparation for the session exams. The contents of the revision tests are:

- |              |          |
|--------------|----------|
| a. MCQs (30) | 30 marks |
| b. SEQs (6)  | 30 marks |

**Note:** The DME maintains a record of all grand tests along with the keys to the MCQs and SEQs and the results. These results are used for the calculation and assessment of each student in terms of their acquisition of knowledge and skills. Four sets of revision tests are held annually. One each before the early session, mid-session, late session and/or send-up examination.

**Session Examination:** As per the annual planner and schedule, three session exams are held every year and these are generally held in March, June and August each year. The late session examination is held in August and as an extra opportunity for the students to qualify the send-ups for the border line cases is only held one month before the prof exam. The following session exams are held:

- |                              |                   |
|------------------------------|-------------------|
| a. Early Session Examination | 50% of syllabus   |
| b. Mid-Session Examination   | 85% syllabus      |
| c. Late Session Examination  | 100% syllabus     |
| d. Send-up Examination       | For the very weak |

The details of the session examination are as under

- |  |                     |
|--|---------------------|
| a. Theory - 50% marks divided as under |                     |
| 1) MCQs                                | 45% of theory marks |
| 2) SEQs                                | 45% of theory marks |
| 3) Log book / copy                     | 10% of theory marks |
| b. OSPE/OSCE/Viva - 50% marks          |                     |



**Note:** The DME maintains a record of all session exams along with the keys to the MCQs and SEQs and the results. These results are used for the calculation and assessment of each student in terms of their acquisition of knowledge and skills. Four sessions examinations are held annually.

**OSPE (Objective Structured Practical Examination):** This depicts the scenario based clinical setting and various stations are arranged. The student has to go from one station to the other to answer the question or to display his practical skill. This is aimed at assessing both the knowledge and skills of the student. The format and the standard of the scenario based problems/questions are in line with the standards prescribed by the University of Health Sciences.

**Note:** The DME maintains a record of all OSPEs along with the keys to the OSPE and the results. These results are used for the calculation and assessment of each student in terms of their acquisition of knowledge and skills. Sample OSPE paper is attached as **Annexure-B**. Since OSPE is a part of session exams therefore four sessions of OSPE are held each year.

**OSCE (Objective Structured Clinical Examination):** This depicts the scenario based clinical setting and various stations are arranged. The student has to go from one station to the other to answer the question or to display his clinical skills. This is aimed at assessing both the knowledge and skills of the student. The format and the standard of the scenario based problems/questions are in line with the standards prescribed by the University of Health Sciences.

**Note:** The DME maintains a record of all OSCEs along with the keys to the OSCE and the results. These results are used for the calculation and assessment of each student in terms of their acquisition of knowledge and skills. Sample OSCE paper is attached as **Annexure-C**. Since OSCE is a part of session exams therefore four sessions of OSCE are held each year.

**Viva:** This is an oral examination to which the student is subject to be examined by two members of the Faculty one acting as the internal examiner and the other acting as the external examiner. The student is grilled in these oral questioning sessions. The student is asked on various clinical aspects to ascertain his knowledge.

**Note:** The DME maintains a record of all Viva and the results. These results are used for the calculation and assessment of each student in terms of their acquisition of knowledge and skills. Since Viva is a part of session exams therefore four sessions are held each year.

**Copies and Log Books:** Whereas copies are maintained in 1<sup>st</sup> 2<sup>nd</sup> and 3<sup>rd</sup> year of the basic sciences, the log books are maintained for the 4<sup>th</sup> year and the final year for the clinical subjects. The completion of the copies and the log books is mandatory and these have to be produced before the internal and the external examiner on all session examinations and annual Prof exam. Copies and log books carry 10 marks and are a valid record for the purpose of assessment besides being a record of the students' clinical exposure.

**Assignments:** These are normally generated by the Community Medicine and the Department of Medicine in which the departments give assignments for the students to be completed in their own time. Assignments are included as a part of practical assessment and left to the discretion of the Head of Department.

**Research work:** The Department of Community Medicine as a part of its Curriculum train the students in carrying out research. These research projects are covered in Standard 12 – Research & Scholarship and research records are available in the Department of Community Medicine. Research works are included as a part of practical assessment and left to the discretion of the Head of Department.

**Tutorials:** These are held before every grand test to clear the concepts of the students on the subject. The performance of the students in the tutorials is included in the viva assessment.

**Long Case and Short Case:** This system of OSPE and OSCE is to ascertain the clinical acumen of the student. These are held with the session examinations and form of a part of the practical/clinical assessment.

### **Notification of Results**

The Assessment Committee will display result on notice board as well as the results are sent through SMS to the father of the student.

Results as hard copy will also be sent to parents after each term.

### **Conducting Examinations and Assessments**

Conducting Examinations and Assessments According to University of Health Sciences Guidelines. In all examinations and assessments, the conditions underpinning the examination or assessment shall be displayed on concerned department notice boards to students prior to the examination or assessment taking place.

***Note:** Any requests for special assistance example reader/writer are to be made prior to the examination or assessment.*

- g. Introducing students to the system of simulated and standardized patients

### **Response to Parents:**

Parents are kept informed about the result of each student. The results are dispatched as follows:

- |                          |   |
|--------------------------|---|
| a. Grand Test:           | by SMS  |
| b. Revision Test:        | by SMS  |
| c. Session Examinations: | as a report containing the results of all grand tests of all subjects for that class. Three session exam reports are sent. Reports of each session for each class are attached as <b>Annexure-I</b> . |
| d. OSPE                  | Included in the session result  |
| e. OSCE                  | Included in the session result  |
| f. Viva                  | Included in the session result  |
| g. Log books / Copies    | Included in the session result  |

h. Assignments	Included in the session result
i. Research work	Included in the session result
j. Tutorials	Included in the session result
k. Long case	Included in the ward test / clinical test
l. Short case	Included in the ward test / clinical test









