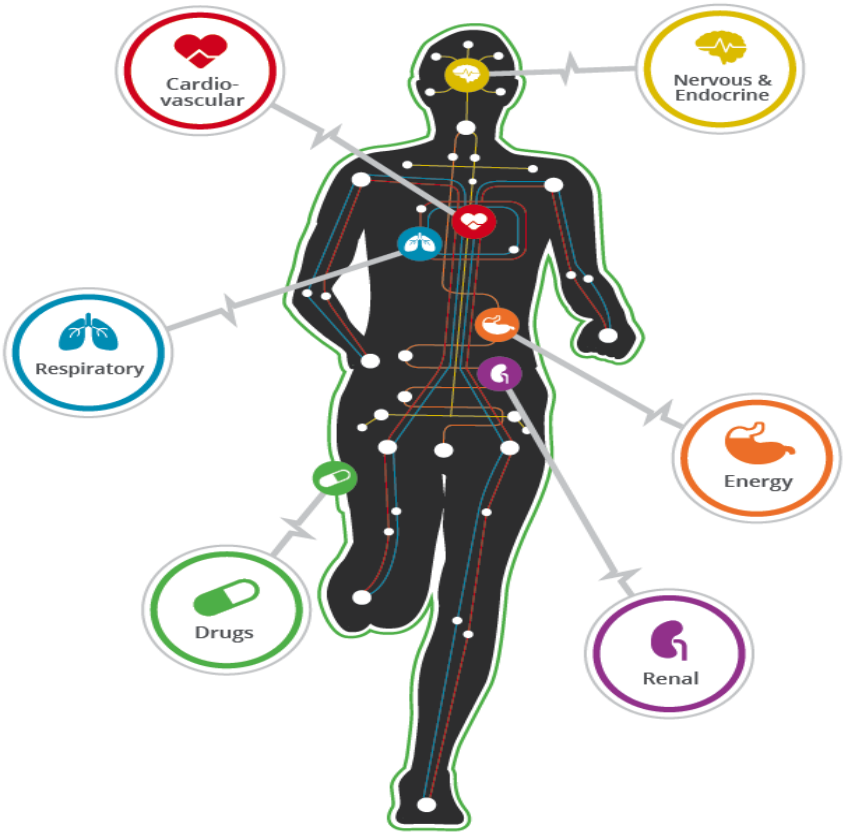
LAHORE
MEDICAL & DENTAL
COLLEGE

DEPARTMENT OF PHYSIOLOGY

STUDY GUIDE FOR 2nd PROF MBBS STUDENTS



LAHORE MEDICAL AND DENTAL COLLEGE

Study Guide, Department of Physiology, 2023

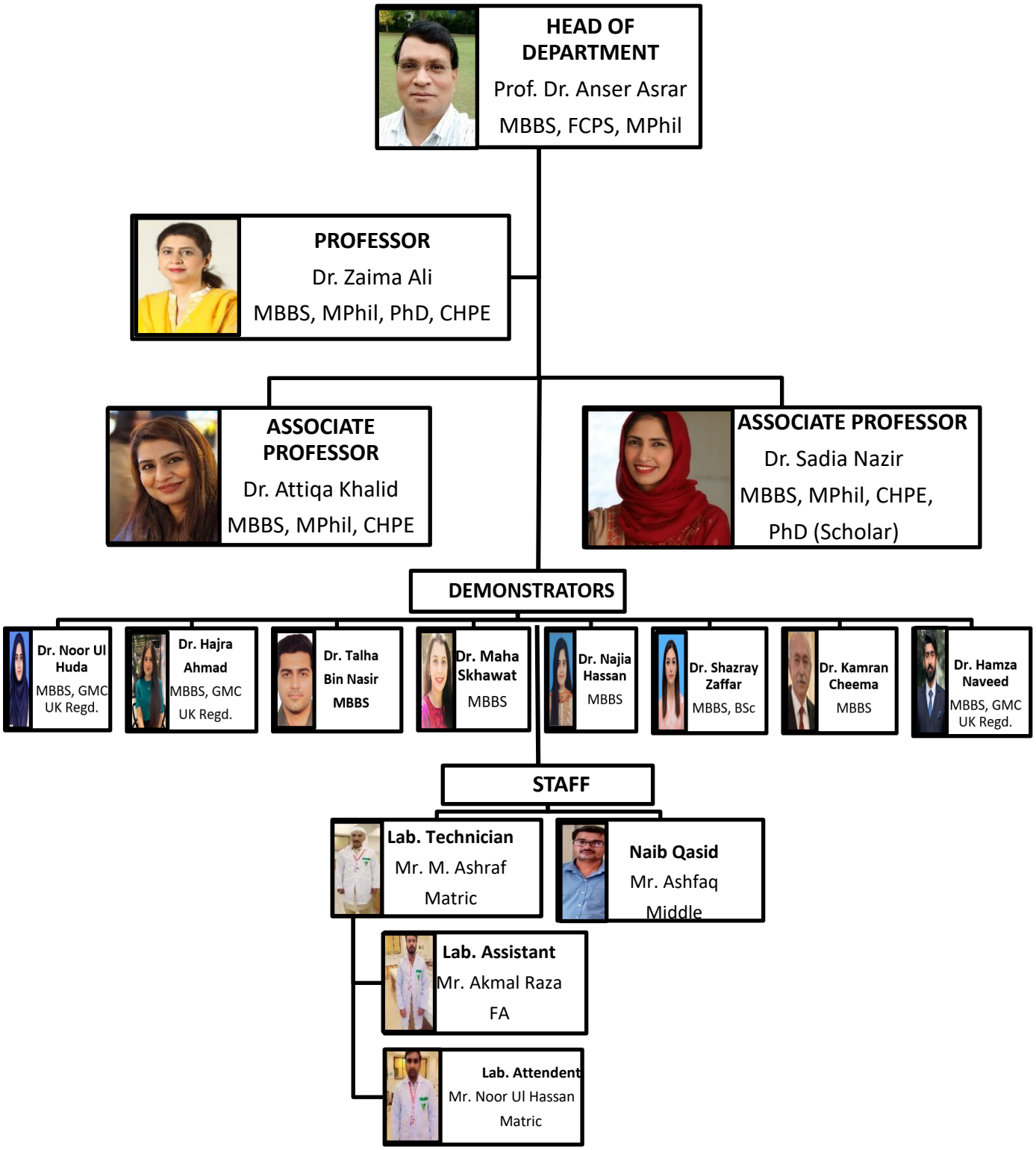
Mission of LMDC

The Lahore Medical & Dental College is committed in its pursuit of excellence to providing the best academic facilities and atmosphere to its students.

Our mission is to: “Train future leaders of medicine who set new standards in knowledge, care and compassion”.

The well qualified and committed faculty of LMDC provides combination of nurturing support and challenge to the students to reach their maximum potential.

DEPARTMENTAL ORGANOGRAM/HIERARCHY



SCOPE OF PHYSIOLOGY DEPARTMENT

Physiology is the study of normal function of human body. It forms the essential baseline knowledge for accurate perception of Pathology, Pharmacology and Medicine in the upcoming years of medical education.

The Department of Physiology, Lahore Medical and Dental College is state of art in providing Physiology education in accordance with guidelines of PMDC also incorporating latest teaching learning methodologies introduced by Department of Medical Education. The faculty to student ratio and laboratory equipment is according to PMDC latest criteria.

INTRODUCTION

Medical education is a life-long process and MBBS curriculum is a part of the continuum of education from pre-medical education, MBBS, proceeding to house job, and post-graduation. PM&DC outlines the guiding principles for undergraduate medical curriculum and has defined the generic competencies and desired outcomes for a medical graduate to provide optimal health care, leading to better health outcomes for patients and societies. These generic competencies set the standards of care for all physicians and form a part of the identity of a doctor. Each competency describes a core ability of a competent physician. This study guide will give an insight to the students about all these competencies and how to plan their educational activities in the subject of Physiology.

TARGET AUDIENCE

2nd Year MBBS

LEARNING OBJECTIVES *(knowledge, skills, attitude)*

1) To equip the students with specific knowledge, essential skills and appropriate attitude towards the human body
2) To be able to understand the functions of each organ system of the body and integrate the functioning with the knowledge of anatomy and biochemistry.
3) To comprehend how basic physiological systems interact to overcome the stressful and challenging conditions and why they fail
4) To think critically, apply the physiological relevance with the clinical situations and explain the pathophysiology of common diseased conditions
5) to become problem solvers, dealing effectively with familiar and unfamiliar problems
6) to become lifelong learners
7) to direct their own learning and evaluate this activity
8) to be able to reason critically and make justifiable decisions regarding patient management
9) to practice evidence-based medicine
10) to always ensure patient safety
11) to adopt a multidisciplinary approach for health promoting interventions

12) to be able to demonstrate professional values of self and professional accountability, honesty, probity, and ethics

TEACHING METHODOLOGIES FOR PHYSIOLOGY

1) Interactive Lectures: for active involvement of students some engagement trigger like Brainstorming, Think, pair, and share, Q&A sessions are introduced.
2) Tutorials: set of instructions to complete a task , to an interactive problem solving session
3) Small group discussions: active involvement by everyone especially shy and less articulate are encourage to contribute Students learn from each other and everyone gets more practice at expressing their ideas
4) Viva exams: to improve learner presentation, speaking and interpersonal communication skills.
5) Essential skills to be learned in skill lab: provide a safe and protected environment in which the learner can practice clinical skills before using them in real clinical settings, such as performance of CPR.
6) Power point presentations by students: delivering positive learning experiences. And excellent communication (written, oral, and listening) skills.
7) Practical performance to enhance theoretical concepts:
8) Self-directed learning: is the most vital part to solve problematic cases, go through different learning resources and discuss with peers and the faculty to clarify difficult concepts
9) Online Lectures, Online Viva and written exams

ATTENDANCE REQUIREMENT FOR PHYSIOLOGY

1) Students are expected to attend all scheduled teaching sessions and examinations
2) Attendance in lectures, tutorials, and wards is mandatory. Absence from these sessions will make the students ineligible to sit the final summative assessment.
3) A minimum of 75 % attendance in the lectures, wards is mandatory to appear in the summative UHS examination
4) Attendance will be recorded through a log-in/log-out biometrics system
5) Absence due to illness must be certified appropriately by the General Physician

LEARNING RESOURCES

1. Departmental library
2. IT library
3. Recommended books
4. Reference books

RECOMMENDED BOOKS

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

3. Physiology by Berne and Levy, Latest Ed.
4. Human Physiology: The Basis of Medicine by Gillian Pocock, Christopher D. Richards, Latest Ed.
5. Physiological Basis of Medical Practice by John B. West and Taylor, 12th

REFERENCE BOOKS

Board Review Series by Linda S Costanzo

Human Physiology from Cells to System by Lauralee Sherwood

Essentials of Medical Physiology by Mushtaq Ahmed

COURSE TO BE STUDIED (Syllabus)

PHYSIOLOGY (MBBS 1st Prof. Part-II)

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

Body Fluids and Kidney

1. Describe the components and quantitative measurements of body fluids.
2. Discuss the different fluid compartments, tissue and lymph fluid.
3. Describe the structure of the kidney and nephron, and explain general functions of the kidney.
4. Describe the GFR and its regulation.
5. Describe the formation of urine including filtration, re-absorption and secretion.
6. Discuss plasma clearance.
7. Describe the mechanism of concentration and dilution of urine
8. Describe regulation of osmolality, water balance and acid base balance
9. Describe the role of the kidney in blood pressure regulation.
10. Describe the hormonal functions of the kidney.
11. Describe acidification of urine and its importance.
12. Describe the mechanism of micturition and its control.

Applied Physiology:

Understands:

1. Renal plasma clearance tests and their clinical significance.
2. Dehydration, rehydration, overhydration and oedema.
3. Renal failure and dialysis.
4. Metabolic acidosis and alkalosis.
5. Abnormalities of micturition.

Nervous System

1. Describe general organization of the nervous system.
2. Describe the properties of synaptic transmission.
3. Classify the neurotransmitters and explain their functions.
4. Explain neuropeptides and their functions
5. List the types and describe the properties and functions of sensory receptors.
6. Describe the pathways for transmission of somatic sensations
7. Define reflex action. Classify and describe reflexes

8. Describe the muscle spindle and Golgi tendon organ. Explain their functions.
9. Describe the physiology of pain and analgesia system.
10. Explain the functions of the cerebral cortex.
11. Differentiate between the sensory and motor cortex and their functions.
12. Describe the motor pathways including pyramidal and extrapyramidal.
13. Describe basal nuclei (basal ganglia) and their functions.
14. Describe cerebellum and its function.
15. Describe the functions of vestibular apparatus.
16. Explain the organization and functions of reticular formation.
17. Explain mechanism and regulation of the muscle tone.
18. Describe the control of posture and equilibrium.
19. Explain the physiology of sleep.
20. Describe the physiology of memory.
21. Describe the mechanism and control of speech.
22. Discuss the functions of thalamus
23. Discuss the functions of hypothalamus
24. Explain the components and functions of limbic system.
25. Describe the production, circulation, absorption and functions of CSF.
26. Describe the blood brain and blood CSF barriers and their clinical significance.
27. Describe the organization and functions of the autonomic nervous system.

Applied Physiology

Understands:

1. Significance of dermatomes.
2. Injuries of the spinal cord.
3. Hemiplegia and paraplegia.
4. Diseases related to Basal ganglia.
5. Effects of cerebellar dysfunction.
6. Hydrocephalus.
7. Alzheimer's disease.
8. Speech disorders
9. Sleep disorders.
10. Clinical abnormalities of pain.

Endocrinology

1. Classify the hormones and describe mechanism of their action
2. Name the hormones secreted by the anterior and posterior pituitary and describe their regulation and functions.
3. Describe the neuroendocrine functions of the hypothalamus
4. Describe the physiological changes of growth and aging.
5. Describe the functions and regulation of the hormones secreted by thyroid gland.
6. Describe the hormones regulating calcium homeostasis (parathormone, vitamin D and calcitonin)
7. Name the hormones secreted by the adrenal cortex and describe their functions and regulation.
8. Name the hormones secreted by the adrenal medulla and describe their functions and regulation.
9. Describe the endocrine functions of the pancreas and regulation of pancreatic hormones.
10. Describe the endocrine functions of pineal gland.

Applied Physiology

Understands:

1. Acromegaly, gigantism and dwarfism.
2. Effects of panhypopitutiarism.
3. Diabetes insipidus.
4. Thyrotoxicosis, myxoedema and cretinism
5. Pheochromocytoma.
6. Cushing's disease / syndrome.
7. Addison's disease.
8. Hypocalcemia and hypercalcemia.
9. Adrenogenital syndrome.
10. Conn's syndrome.
11. Diabetes mellitus and hypoglycaemia.

Gastrointestinal Tract

1. Describe the general functions of gastrointestinal tract.
2. Describe the enteric nervous system, control of gastrointestinal motility and secretion
3. Describe mastication, swallowing and their control

4. Describe the motility of the stomach, small intestine, large intestine and regulation.
5. Describe the functions of GIT hormones
6. Describe gallbladder motility and its regulation
7. Explain mechanism of vomiting and its control pathway
8. Explain defecation and its control pathway

Applied Physiology

Understands:

1. Dysphagia
2. Achalasia cardia
3. Diarrhea and constipation
4. Megacolon

Reproduction

1. Describe the functions of the male reproductive system.
2. Describe the mechanism of erection and ejaculation.
3. Describe the production and function of testosterone.
4. Describe the physiological changes during male puberty.
5. Describe the function of the female reproductive system.
6. Explain the production and function of oestrogen and progesterone.
7. Describe the functions of hypothalamo-hypophysio-gonadal axis.
8. Describe the ovarian and endometrial cycle.
9. Describe the physiological changes during female puberty and menopause.
10. Discuss pregnancy and explain the physiological changes taking place in the mother.
11. Describe the functions of placenta.
12. Discuss the hormones regulating parturition, lactation and development of breast.

Applied Physiology

Understands:

1. Male infertility.
2. Female infertility.
3. Postmenopausal syndrome / Andropause.

4. Contraception.
5. Basis for pregnancy tests.
6. Hypogonadism / hypergonadism.
7. Cryptorchoidism.

Special Sense

1. Describe the optics of the eye, mechanism of accommodation, light reflex.
2. Explain visual acuity, depth perception, neural functions of the retina.
3. Describe the errors of refraction and their corrections.
4. Describe the secretion, circulation, drainage and functions of aqueous humor.
5. Describe the movements of eyeballs.
6. Describe the visual transduction, color vision, visual cortex and visual pathway.
7. Describe the mechanisms for the light and dark adaptation.
8. Describe the functions of external ear.
9. Enumerate the contents of middle ear cavity and functions of the middle ear
10. Describe the structure and functions of internal ear.
11. Explain the determination of the sound frequency, loudness, direction of sound, auditory pathway and auditory cortex.
12. Describe the signal transduction for hearing.
13. Describe the signal transduction for taste and smell.
14. Describe the pathways for the sense of taste and smell.

Applied Physiology

Understands:

1. Types of deafness.
2. Errors of refraction.
3. Lesions of the visual pathway.
4. Night blindness.
5. Colour blindness.
6. Squint.
7. Argyll Robertson pupil.
8. Horner's syndrome.
9. Abnormalities of sense of smell and taste.
10. Glaucoma.

PHYSIOLOGY PRACTICAL

Nervous System

1. Examination of superficial reflexes.
2. Examination of deep reflexes.
3. Examination of motor system.
4. Cerebellar function tests.
5. Examination of sensory system.
6. Examination of 12 cranial nerves (3-4 settings).

Special Senses

1. Plotting of the field of vision (perimetry and confrontational methods).
2. Testing the visual acuity for near and distant vision.
3. Elicitation of light reflex (direct and consensual) and accommodation reflex.
4. Ophthalmoscopy.
5. Testing the colour vision.
6. Testing for hearing.
7. Testing taste and smell.

Pregnancy Tests

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

MBBS FIRST PROFESSIONAL (Part-II)

Physiology (SEQs and MCQs)

Table of Specifications (ToS)

Topic / Chapter	No. of MCQs	No. of SEQs
Kidney and body fluids	08	02
Nervous system	12	02
Special senses	06	01
Endocrines	08	02
Reproduction	06	01
GIT	05	01
Total	**45**	**09**

MBBS FIRST PROFESSIONAL (Part-II)

PHYSIOLOGY

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
40% C2 } OSPE
30% C3

- **Practical (30 marks)**
  - Practical 20 marks
  - Procedure Writing 05 marks
  - Yearly Workbook Assessment 05 marks

ALIGNMENT OF EDUCATION WITH STUDY HOURS (2nd year MBBS)

Total weeks	**36**
Total Hours	**282**
• Lectures 6×45	138
• Practical 1× 1.5	54
• Tutorials 1× 1.5	54
• Grand tutorials 8×1.5	12

2nd YEAR MBBS ACADEMIC PLANNER
Physiology
SESSION 2023-24

Subject	**Physiology**
Session	2023-24
Total lecture Hours	138 Hrs
Total no. of lectures	182
Total duration of each lecture	45 minutes

Teaching Faculty:

Sr. #	Name	Designation	Topics Allocation
1.	Prof. Anser Asrar	Professor & Head department	Endocrinology
2.	Prof. Uzma Zargham	Professor	Motor System
3.	Prof. Zaima Ali	Professor	Renal
4.	Dr. Attiqa Khalid	Associate Professor	Sensory, Special senses
5.	Dr. Sadia Nazir	Associate Professor	GIT, Reproduction

Departmental Planner:

WEEK 01-10 UNIT XIV – Endocrinology
UNIT V - The Body Fluids and Kidneys

30-Jan-23	Introduction 1
30-Jan-23	Introduction 2
31-Jan-23	Introduction 3
31-Jan-23	Introduction 4
06-Feb-23	Pituitary Hormone 1
06-Feb-23	Pituitary Hormone 2
07-Feb-23	Pituitary Hormone 3
07-Feb-23	Pituitary Hormone 4
13-Feb-23	Pituitary Hormone 5
13-Feb-23	Thyroid Hormone 1
14-Feb-23	Thyroid Hormone 2
14-Feb-23	Thyroid Hormone 3
20-Feb-23	Thyroid Hormone 4
20-Feb-23	Thyroid Hormone 5
21-Feb-23	Adrenocortical 1
21-Feb-23	Adrenocortical 2
27-Feb-23	Adrenocortical 3
27-Feb-23	Adrenocortical 4
28-Feb-23	Adrenocortical 5
28-Feb-23	Adrenocortical 6
13-Mar-23	Insulin Glucagon 1
13-Mar-23	Insulin Glucagon 2
14-Mar-23	Insulin Glucagon 3
14-Mar-23	Insulin Glucagon 4
20-Mar-23	Insulin Glucagon 5
20-Mar-23	Insulin Glucagon 6
21-Mar-23	Parathyroid Hormone 1
21-Mar-23	Parathyroid Hormone 2
27-Mar-23	Parathyroid Hormone 3
27-Mar-23	Parathyroid Hormone 4
03-Apr-23	Parathyroid Hormone 5
03-Apr-23	Parathyroid Hormone 6
01-Feb-23	Body Fluids 1
02-Feb-23	Body Fluids 2
08-Feb-23	Body Fluids 3
09-Feb-23	Body Fluids 4
15-Feb-23	Urinary system 1
16-Feb-23	Urinary system 2
22-Feb-23	Urinary system 3

23-Feb-23	Urinary system 4
01-Mar-23	GFR - Renal Blood Flow 1
02-Mar-23	GFR - Renal Blood Flow 2
15-Mar-23	GFR - Renal Blood Flow 3
16-Mar-23	GFR - Renal Blood Flow 4
22-Mar-23	Renal Tubular reabsorption 1
28-Mar-23	Renal Tubular reabsorption 2
28-Mar-23	Renal Tubular reabsorption 3
29-Mar-23	Renal Tubular reabsorption 4
30-Mar-23	Renal Tubular reabsorption 5
03-Apr-23	Urine Concentration and dilution 1
04-Apr-23	Urine Concentration and dilution 2
05-Apr-23	Urine Concentration and dilution 3
WEEK 10-16	**UNIT V - The Body Fluids and Kidneys** **UNIT IX - The Nervous System: A. General Principles and Sensory Physiology** **UNIT XII – Gastrointestinal Physiology**
10-Apr-23	Urine Concentration and dilution 4
11-Apr-23	Urine Concentration and dilution 5
13-Apr-23	Regulation of potassium 1
17-Apr-23	Regulation of potassium 2
18-Apr-23	Acid base balance 1
20-Apr-23	Acid base balance 2
25-Apr-23	Acid base balance 3
26-Apr-23	Acid base balance 4
02-May-23	Acid base balance 5
03-May-23	Diuretics 1
08-May-23	Diuretics 2
09-May-23	Diuretics 3
06-Apr-23	Organization
10-Apr-23	synapses and neurotransmitters 1
11-Apr-23	synapses and neurotransmitters 2
12-Apr-23	synapses and neurotransmitters 3
17-Apr-23	Sensory receptors and circuits 1
18-Apr-23	Sensory receptors and circuits 2
19-Apr-23	Sensory receptors and circuits 3
25-Apr-23	Sensory receptors and circuits 4
27-Apr-23	Somatic sensations 1
02-May-23	Somatic sensations 2
04-May-23	Somatic sensations 3
08-May-23	Somatic sensations 4
09-May-23	Somatic sensations 5
11-May-23	Somatic sensations 6
18-May-23	Somatic sensations 9

10-May-23	GI functions 1
15-May-23	GI functions 2
16-May-23	GI functions 3
17-May-23	GI functions 4
WEEK 17-25	**UNIT XII – Gastrointestinal Physiology**
	UNIT X- The Nervous System: B. The Special Senses
22-May-23	GI functions 5
23-May-23	Propulsion and mixing of food 1
24-May-23	Propulsion and mixing of food 2
29-May-23	Propulsion and mixing of food 3
30-May-23	Propulsion and mixing of food 4
31-May-23	Propulsion and mixing of food 5
05-Jun-23	Secretory function of GIT 1
06-Jun-23	Secretory function of GIT 2
07-Jun-23	Secretory function of GIT 3
12-Jun-23	Secretory function of GIT 4
13-Jun-23	Secretory function of GIT 5
14-Jun-23	Physiology of GIT disorders 1
17-Jun-23	Physiology of GIT disorders 2
18-Jul-23	Physiology of GIT disorders 3
19-Jul-23	Physiology of GIT disorders 4
24-Jul-23	Obesity and Appetite 1
22-May-23	Optics of vision 1
23-May-23	Optics of vision 2
25-May-23	Optics of vision 3
29-May-23	Retina 1
30-May-23	Retina 2
01-Jun-23	Retina 3
05-Jun-23	Neurophysiology of vision 1
06-Jun-23	Neurophysiology of vision 2
08-Jun-23	Neurophysiology of vision 3
12-Jun-23	Hearing 1
13-Jun-23	Hearing 2
15-Jun-23	Hearing 3
17-Jul-23	Hearing 4
18-Jul-23	Taste 1
20-Jul-23	Smell 1
WEEK 26-32	**UNIT XI - The Nervous System: C. Motor and Integrative Neurophysiology**
	UNIT XIV– Reproduction
25-Jul-23	Male Reproduction 1
31-Jul-23	Male Reproduction 2
01-Aug-23	Male Reproduction 3
07-Aug-23	Female Reproduction 1
08-Aug-23	Female Reproduction 2

15-Aug-23	Female Reproduction 3
21-Aug-23	Female Reproduction 4
22-Aug-23	Pregnancy and Lactation 1
28-Aug-23	Pregnancy and Lactation 2
29-Aug-23	Pregnancy and Lactation 3
04-Sep-23	Fetal Physiology 1
05-Sep-23	Fetal Physiology 2
24-Jul-23	Cord Reflexes 1
25-Jul-23	Cord Reflexes 2
26-Jul-23	Cord Reflexes 3
27-Jul-23	Cord Reflexes 4
31-Jul-23	Cord Reflexes 5
01-Aug-23	Cord Reflexes 6
02-Aug-23	Motor Function 1
03-Aug-23	Motor Function 2
07-Aug-23	Motor Function 3
08-Aug-23	Motor Function 4
09-Aug-23	Motor Function 5
10-Aug-23	Cerebellum 1
15-Aug-23	Cerebellum 2
16-Aug-23	Cerebellum 3
17-Aug-23	Basal Ganglia 1
21-Aug-23	Basal Ganglia 2
22-Aug-23	Basal Ganglia 3
23-Aug-22	Intellectual Functions of Brain-Speech 1
24-Aug-23	Intellectual Functions of Brain-Speech 2
28-Aug-23	Intellectual Functions of Brain-Speech 3
29-Aug-23	Limbic System 1
30-Aug-23	Limbic System 2
31-Aug-23	Limbic System 3
04-Sep-23	Sleep Brain Activity 1
05-Sep-23	Sleep Brain Activity 2
06-Sep-23	Sleep Brain Activity 3
07-Sep-23	Sleep Brain Activity 4
WEEK 33-34	**UNIT XI - The Nervous System: C. Motor and Integrative Neurophysiology Revision**
11-Sep-23	Autonomic Nervous System 1
12-Sep-23	Autonomic Nervous System 2
13-Sep-23	Autonomic Nervous System 3
14-Sep-23	Cerebral Blood Flow 1
18-Sep-23	Cerebral Blood Flow 2
11-Sep to 21-Sep	Revision
WEEK 34-37	**Revision**

2nd Year MBBS (2023)

Test Planner

15-Mar-23	Test 1
12-Apr-23	Test 2
10-May-23	Test 3
7-Jun-23	Test 4
2-Aug-22	Test 5
13-Sep-23	Test 6

ASSESSMENT METHODOLOGY

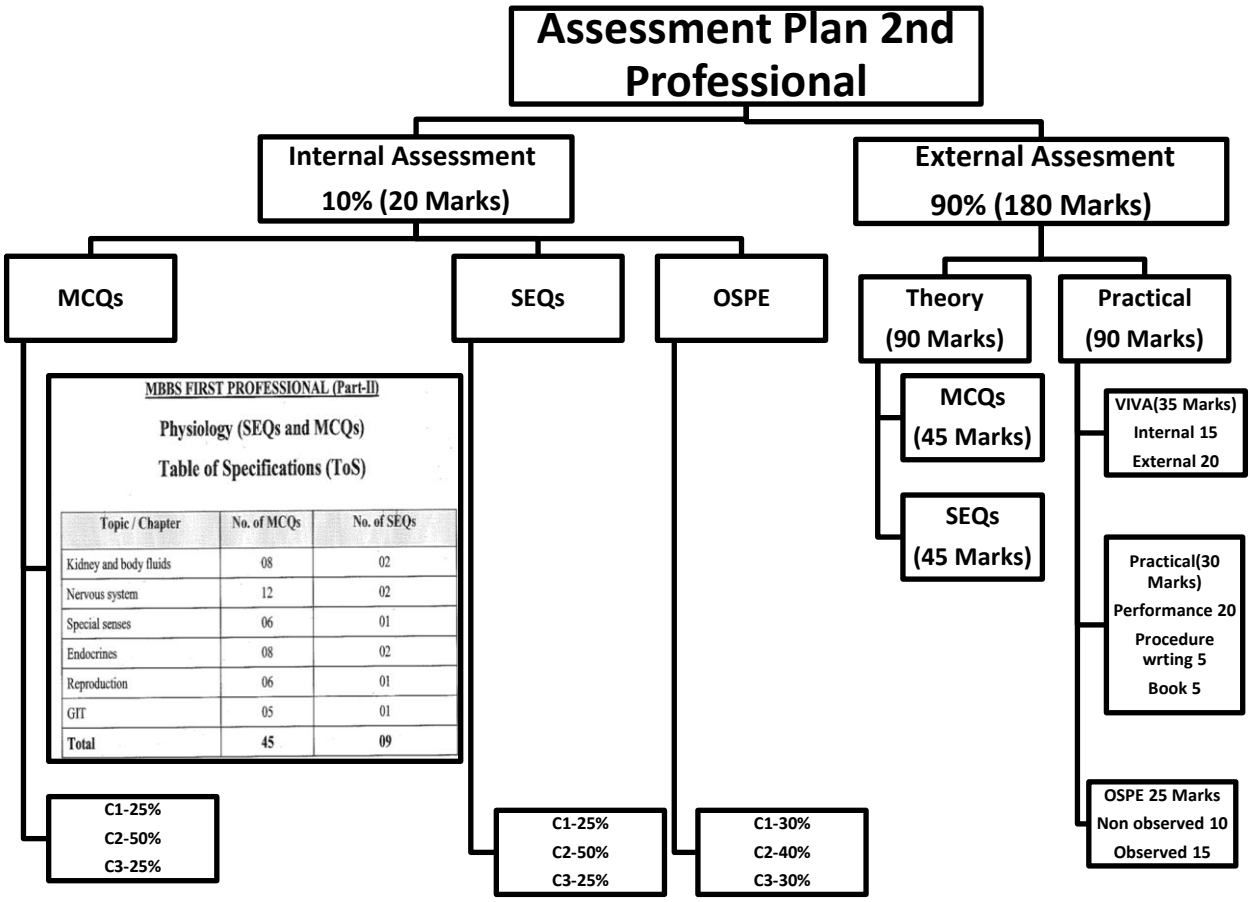
Formative

1. Class tests
2. Batch wise Tutorial Viva of assigned topics
3. Send –up

Summative

Written Examination by UHS: 90 Marks

Practical examination by UHS: 90 Marks



COUNSELLING:

a. Career Guidance

Physiology department help students and demonstrators in career exploration, making career choices, managing career changes, lifelong career development and dealing with other career-related issues.

b. Psychosocial Counselling

An educational career is a challenging time, to facilitate the total wellbeing of our students Physiology department is considerate of the psycho social aspect as well. Counselling services are completely confidential and free from any judgement based upon students' results and/or academic performance. Counselling and psychological wellbeing service providers are sensitive to diversity issues and dedicated to assisting any LMDC student, without discrimination of gender, race, religion, socioeconomic status culture or disability. Psychosocial counselling improves communication and interpersonal skills, greater self-acceptance and self-esteem, ability to change self-defeating behaviors/habits, better expression and management of emotions, including anger, relief from depression, anxiety or other mental health conditions.

Consultant faculty:

Dr. Sadia Nazir (Associate Professor Physiology)