SYLLABUS FOR M.PHIL PHYSIOLOGY

MAJOR AND MINOR (PART-1 AND PART-2)

BY

DEPARTMENT OF PHYSIOLOGY

LIAQUAT UNIVIRSITY OF MEDICAL AND HEALTH SCIENCES, JAMSHORO

PROF. DR KHALIDA SHAIKH
PhD (PHYSIOLOGY)
CHAIRPERSON
DEPARTMENT OF PHYSIOLOGY
LUMHS, JAMSHORO

DEPARTMENT OF PHYSIOLOGY

Liaquat University of Medical Health & Sciences – Jamshoro

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physiology@lumhs.edu.pk

SAY NO TO CORRUPTION

Postgraduate Program in Physiology

Degree Offered: Master of Philosophy (M.Phil.) in Physiology

Duration: 2 Years (30 credit hours)

The Master of Philosophy (M.Phil.) in Physiology program is a research-oriented degree that aims to provide advanced training in the field of human physiology. The program's main objective is to equip students with the knowledge and skills necessary to conduct original research in physiology and related disciplines.

The program's specific objectives include:

- Developing an understanding of the principles and concepts of physiology and their application in research.
- Providing students with an opportunity to undertake independent research in physiology.
- Enhancing students' skills in critical thinking, problem-solving, and scientific communication.
- Providing students with training in research methods, including experimental design, data analysis, and interpretation.
- Developing students' skills in scientific writing, including the preparation of research proposals, scientific papers, and grant applications.

Rationale of the program:

The M. Phil in Physiology program is designed to address the growing need for highly skilled researchers in the field of human physiology. Human physiology is a vital and rapidly advancing discipline that seeks to understand the complex interactions of physiological systems and how they relate to health and disease. A deep understanding of physiology is necessary to develop new treatments and therapies for a wide range of medical conditions, including cardiovascular disease, diabetes, and cancer.

The M.Phil in Physiology program aims to provide students with the knowledge and skills necessary to conduct original research in physiology and related fields. This includes advanced training in research methods, experimental design, and data analysis, as well as the development of critical thinking and problem-solving skills. Through independent research projects, students will develop a deep understanding of physiological mechanisms, research ethics, and the scientific process.

Graduates of the M.Phil in Physiology program will be well-equipped to pursue careers in academic and research institutions, healthcare organizations, and government agencies. They will also be prepared to pursue further study at the doctoral level in Physiology or related disciplines.

Overall, the M.Phil in Physiology program will contribute to the advancement of knowledge in the field of human physiology and will train the next generation of researchers and leaders in this important field.

Method of Instructions:

- Formal lecture/tutorials & laboratory demonstrations.
- Literature review on specified physiology topics, write-up and presentation in seminar.

M.PHIL PHYSIOLOGY PROGRAM (2 YEARS) 30 CREDIT HOURS		
COURSE WORK		**24 CREDIT HOURS**
PART-1	**PHYSIOLOGY+WORKSHOPS**	**08 CREDIT HOURS**
	MINOR-1	**04 CREDIT HOURS**
PART-2	**PHYSIOLOGY+WORKSHOPS**	**08 CREDIT HOURS**
	MINOR-2	**04 CREDIT HOURS**
RESEARCH AND THESIS		**06 CREDIT HOURS**

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M.PHIL PART-1 PHYSIOLOGY (MAJOR) COURSE CONTENT
1. HOMEOSTASIS
2. CELL MEMBRANE AND TRANSPORT
3. ELECTROPHYSIOLOGY
4. NERVE AND MUSCLE PHYSIOLOGY
5. BLOOD
6. CARDIOVASCULAR SYSTEM
7. RESPIRATION

PRACTICAL
1. PREPARATION OF BLOOD FILM AND IDENTIFICATION OF DIFFERENT TYPES OF CELLS.
2. DIFFERENTIAL LEUKOCYTES COUNT(DLC)
3. DETERMINATION OF HEMOGLOBIN PERCENTAGE %
4. DETERMIONATION OF ERYTHROCYTE SEDIMENTATION RATE (ESR).
5. DETERMINATION OF BLOOD GROUPS
6. DETERMINDATION OF BLEEDING AND CLOTTING TIME.
7. TO RECORD SIMPLE MUSCLE TWITCH
8. TO RECORD PHENOMENON OF MUSCLE FATIGUE.
9. TO RECORD THE EFFECT OF SITTING, STANDING , COUGHING AND DEGLUITITION ON RESPIRATION.
10. TO RECORD LUNG VOLUME AND CAPACITIES IN HEALTHY ADULT.
11. TO RECORD AND INTERPRET THE BASICS OF ECG
12. TO RECORD PULSE OF HEALTH INDIVIDUAL AT REST AND DURING EXERCISE.
13. TO DETERMINE AREAS OF AUSCULTATION AND LISTEN THE NORMAL HEART SOUNDS.
14. TO RECORD BLOOD PRESSURE THROUGH PALPATORY AND AUSCULTATORY METHODS.

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Chapter wise content of Physiology	
Chapter-1	**Homeostasis**
1.	Homeostasis and its feedback mechanisms
Chapter-2	**Cell membrane and transport**
2.	Structure and function of plasma membrane.
3.	Cell Organelles (mitochondria, cytoplasm, endoplasmic reticulum, microsomes, Golgi complex, lysosomes, microtubules, and inclusion bodies.)
4.	Transport Across the Cell membrane. (active and passive)
5.	Cell replication includes chromosomes, genes, and functions of DNA, genetic code, regulation of protein synthesis, genetic expression, and cell differentiation.
Chapter-3	**Electrophysiology**
6.	Resting membrane potential, action potential, Graded Potential, Nernst Potential, spread of excitation and excitation-response coupling.
Chapter-4	**Nerve and Muscle Physiology**
7.	Structure and mechanism of contraction of skeletal, smooth, and cardiac muscle.
8.	Neuromuscular junction, neuromuscular disorders (Myasthenia gravis, LEMS)
Chapter-5	**Blood**
9.	Plasma, it's composition and functions,
10.	Blood cells, their genesis, functions, and abnormalities,
11.	RBC and Erythropoiesis, sites, and stages
12.	Blood groups, their inheritance and importance, Erythroblastosis fetalis
13.	WBC and its types
14.	Immunity and its types
15.	Platelets its regulation and formation
16.	Hemostasis steps and clotting pathways
Chapter-6	**Cardiovascular System**
17.	Properties of Cardiac Muscle.

18.	Action potential and electromechanical coupling in the heart muscle;
19.	Conducting System of heart and Arrhythmias
20.	Cardiac output and its regulation
21.	Cardiac cycle and its events
22.	ECG its interpretation and correlation to cardiac cycle and its events
23.	The vascular system; hemodynamics of blood flow in the vascular system, the exchange vessels, and venous return, lymph and its flow and regional circulation.
24.	Blood pressure and its regulation
25.	Shock, hypertension, heart failure, congenital and valvular heart diseases.
Chapter-7	**Respiratory System**
26.	Anatomical Physiology of respiratory system and morphometrics of lungs.
27.	Mechanics of breathing- static and dynamic, and work of breathing.
28.	Respiratory control mechanisms; central and peripheral chemoreceptors, respiratory reflexes, and origin of respiratory rhythm.
29.	Lung Volume and its capacities
30.	Exchange of gases; ventilation perfusion and gas exchange, VA/Q concept, diffusion of gases across alveoli and capillaries.
31.	Transport of gases in the blood and O2-CO2 dissociation curves.
32.	Respiratory abnormalities: hypoxia, cyanosis, hyper and hypocapnia, chyne-stokes breathing, COPD, restrictive lung diseases, Asphyxia, drowning, CO poisoning.
33.	Physiology of aviation and deep sea-diving

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M.PHIL PART-2 PHYSIOLOGY (MAJOR) COURSE CONTENT
1. GASTROINTESTINAL SYSTEM
2. ENDOCRINOLOGY
3. REPRODUCTIVE PHYSIOLOGY
4. EXCRETAORY SYSTEM AND BODY FLUIDS
5. CENTRAL NERVOUS SYSTEM AND SPECIAL SENSES

PRACTICAL
1. TO CALCULATE THE BODY MASS INDEX
2. TO RECORD BODY TEMPERATURE
3. TO ENLIST THE BASIC MECHANISM OF PREGNANCT TEST
4. EXAMINATION OF SENSORY SYSTEM
5. EXAMONATION OF MOTOR SYSTEM
6. TO ASSESS THE CEREBELLAR FUNCTIONS
7. TO RECORD AND INTRPRET THE BASICS OF EEG.
8. TO DETERMINE VISUAL ACUITY AND COLOR VISION.
9. TO EXAMINE PUPILLARY LIGHT REFLEX.
10.TO ASSESS THE AUDITORY NERVE BY HEARING TEST.
11.TO EXAMINE CRANIAL NERVES.

Chapter wise content of physiology	
Chapter-1	**Gastrointestinal system**
1.	Saliva, Salivary juice, its contents, and functions.
2.	Mastication and swallowing, steps of deglutition and its neuronal control.
3.	Esophagus, peristalsis, gastro-esophageal sphincter.
4.	Stomach, gastric juice its contents, functions, types of cells in stomach .HCL and its regulation
5.	Exocrine pancreas; Methods of study, structure of exocrine pancreas, secretion, it's functions and control.
6.	Secretion of small intestine; Types and control of secretion.
7.	Digestion and absorption in GIT; Methods of study, absorption of water and electrolytes, digestion and absorption of carbohydrates, fats and proteins, their control, and abnormalities.
8.	GIT motility; Methods of study, extrinsic and intrinsic control of motility, stomach, small and large intestine, and their abnormalities.
Chapter-2	**Excretory system and Body Fluids**
9.	General organization and structure of kidney, Renal circulation, and methods of its measurement.
10.	Body fluids and its role in maintenance of homeostasis through kidneys.
11.	Glomerular filtration; Methods of its measurement, normal value, factors affecting it and its control.
12.	Renal reabsorption and secretion; Renal handling of organic and inorganic plasma solutes, transport mechanisms, features of renal tubules, factors affecting reabsorption and secretion in renal tubules, role of PTH, ADH, aldosterone, ANP, renin-angiotensin and prostaglandins.
13.	Urine formation, concentration of urine, counter current mechanism.
14.	acid-base balance, acidification of urine

15.	Micturition reflex and its abnormalities.
Chapter-3	**Endocrine and reproduction**
16.	Mechanism of hormone action; Receptors, membrane permeability, enzyme induction.
17.	Role of hormones in homeostasis; Regulation of osmolality, electrolyte, calcium, blood glucose, energy balance and growth.
18.	Anterior Pituitary, its secretions, its functions, regulation, and effects.
19.	Posterior Pituitary, its secretions, its functions, regulation, and effects.
20.	Thyroid Gland, its secretions, its functions, regulation, and effects.
21.	Calcium Homeostasis (Parathyroid gland)
22.	Pancreas, its secretions, its functions, regulation, and effects.
23.	Adrenal Gland, its secretions, its functions, regulation, and effects.
Chapter-4	**Reproductive physiology**
24.	Male reproductive system; Sex differentiation and spermatogenesis and their control. Role of endocrine in male reproductive function control, abnormalities of male system.
25.	Female reproductive system; Sex differentiation and oogenesis and their control. Menstrual cycle and its endocrine control. Puberty, menopause, and contraception. Pregnancy and lactation.
Chapter-5	**Central nervous system and Special Senses**
26.	Organization of nervous system, structure, Functions of neuron and its types.
27.	Neuroglial cells, types, and functions.
28.	Synapse, types, properties, and mechanism.
29.	Sensory receptors, types, properties, and transduction of stimuli.

30.	Sensory pathways, dorsal column-medial lemniscal system, anterolateral pathways.
31.	Pain pathways, types, suppression, and analgesic system. Headache and thermal sensations.
32.	Spinal cord its structure and functions, Cord reflexes, reflex arc, and reflex action.
33.	Motor cortex and corticospinal tracts(Pyramidal and extra pyramidal)
34.	Cerebellum, functions, circuit, and disorders
35.	Basal ganglia, functions, circuit, and disorders
36.	Limbic system and Hypothalamus
37.	Thermal regulation, Heat production, Heat loss.
38.	Sleep, EEG, and brain waves
39.	General organization of autonomic nervous system.
40.	Effects of sympathetic and para-sympathetic stimulation on specific organs/systems
41.	CSF, synthesis, and functions
42.	Sense of Vision (structure and functions of Eye, Lens, errors of refraction, accommodation, and pupillary reflex)
43.	Fluid system of the eye.
44.	Retina structure and function. Light and dark adaptation.
45.	Visual pathways, visual pathway defects
46.	Sense of hearing structure and functions
47.	Functions of Middle Ear
48.	Functions of Inner ear and auditory pathway.
49.	Sense of taste and smell.

Prof. Dr Khalida Shaikh

Chairperson Department of Physiology

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7. GENERAL ENDOCRINOLOGY
8. GENERAL NEUROPHYSIOLOGY

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2.	Body fluids and its role in maintenance of homeostasis through kidneys.
3.	Glomerular filtration; Methods of its measurement, normal value, factors affecting it and its control.
4.	Renal reabsorption and secretion;
5.	Urine formation, concentration of urine, counter current mechanism.
6.	acid-base balance, acidification of urine
7.	Micturition reflex and its abnormalities.
Chapter-7	**General endocrinology**
8.	Mechanism of hormone action; Receptors, membrane permeability, enzyme induction.
9.	Anterior Pituitary its secretions, its functions, regulation, and effects.
10.	Posterior Pituitary its secretions, its functions, regulation, and effects.
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12.	Calcium Homeostasis (Parathyroid gland)
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14.	Adrenal Gland its secretions, its functions, regulation, and effects.
Chapter-8	**Central nervous system**
15.	Organization of nervous system, structure, Functions of neuron and its types.
16.	Neuroglial cells, types, and functions.
17.	Synapse, types, properties, and mechanism.
18.	Sensory pathways, dorsal column-medial lemniscal system, anterolateral pathways.
19.	Pain pathways, types, suppression, and analgesic system. Headache and thermal sensations.
20.	Spinal cord its structure and functions, Cord reflexes, reflex arc, and reflex action.
21.	Motor cortex and corticospinal tracts(Pyramidal and extra pyramidal)
22.	Cerebellum, functions, circuit, and disorders
23.	Basal ganglia, functions, circuit, and disorders
24.	Limbic system and Hypothalamus
25.	General organization of autonomic nervous system.
26.	CSF, synthesis, and functions

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TABLE OF SEPECIFICATION FOR M.PHIL PART-1 MAJOR

S.NO	CHAPTER	NO. OF LECTURES	PERCENTAGE OF CONTENT	PERCENTAGE OF MCQ'S (OUT OF 100)	SHORT ESSAY QUESTIONS (OUT OF 10)
	HOMEOSTASIS	1	3%	3%	1
	CELL MEMBRANE AND TRANSPORT	4	13%	13%	1
	ELECTROPHYSIOLOGY	1	3%	3%	1
	NERVE AND MUSCLE PHYSIOLOGY	2	6%	6%	1
	BLOOD	8	24%	24%	2
	CARDIOVASCULAR SYSTEM	8	24%	24%	2
	RESPIRATION	9	27%	27%	2
	TOTAL	33	100%	100%	10

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TABLE OF SEPECIFICATION FOR M.PHIL PART-2 MAJOR

S.NO	CHAPTER	NO. OF LECTURES	PERCENTAGE OF CONTENT	PERCENTAGE OF MCQ'S (OUT OF 100)	SHORT ESSAY QUESTIONS (OUT OF 10)
	GASTROINTESTINAL SYSTEM	8	16%	16%	2
	ENDOCRINOLOGY	7	15%	15%	2
	EXCRETAORY SYSTEM AND BODY FLUIDS	8	16%	16%	2
	REPRODUCTIVE PHYSIOLOGY	2	4%	4%	
	CENTRAL NERVOUS SYSTEM AND SPECIAL SENSES	24	49%	49%	4
	TOTAL	49	100%	100%	10

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TABLE OF SEPECIFICATION FOR M.PHIL PART-1/2 MINOR

S.NO	CHAPTER	NO. OF LECTURES	PERCENTAGE OF CONTENT	PERCENTAGE OF MCQ'S (OUT OF 100)	SHORT ESSAY QUESTIONS (OUT OF 10)
1.	HOMEOSTASIS	1	2%	2%	0
2.	CELL MEMBRANE AND TRANSPORT	4	8%	8%	1
3.	ELECTROPHYSIOLOGY	1	2%	2%	0
4.	BLOOD	8	17%	17%	2
5.	RESPIRATION	8	17%	17%	2
6.	EXCRETORY SYSTEM AND BODY FLUIDS.	7	15%	15%	1
7.	GENERAL ENDOCRINOLOGY	7	15%	15%	1
8.	GENERAL NEUROPHYSIOLOGY	11	24%	24%	3
	TOTAL	47	100%	100%	10