

Course of Study Human Physiology including Biophysics at Undergraduate Level (1st MBBS)

Total duration of the 1st MBBS course is 12 months.
(Two Semesters) of which Physiology gets about 480 hours

The teaching of Physiology to the undergraduate medical students will be in the Form of Lectures, Group discussions, Demonstrations, Practicals and Electives.

Lectures	: 280 hours including students seminars (10 hours) And Group discussions (80 hours).
Practicals	: 100 hours
Demonstrations	: 40 hours
Self Study	: 30 hours
Electives	: 30 hours in the Second Semester.

Syllabus for teaching of Physiology for 1st MBBS Lectures.

I. General Physiology

1. Transport across Cell Membrane.
2. Body Fluids including lymph.

II. Nerve

1. Bioelectric phenomena in the Nerve, RMP, Action Potential and its propagation, Neuromuscular transmission.
2. Classification of nerve fibres.
3. Degeneration and regeneration in the nerve.

III. Skeleto-Muscular System

1. Excitation-contraction coupling and molecular basis of contraction in skeletal cardiac and plain muscle.
2. Energy metabolism of muscles and factors affecting development of tension.
3. E.M.G. and Strength-Duration curve.

IV. Blood

1. Physiology of plasma proteins, sites of formation, normal values and functions. Hypoproteinemia.
2. Physiology of R.B.C, W.B.C and Platelets-formation, fate and functions of these cells and their disorders like anemia, leukemia's, thrombocytopenia.
3. A.B.O. and Rh blood group systems. Mismatched blood transfusion and erythroblastosisfetalis.
4. Coagulation-anticoagulants and abnormal conditions.
5. Mononuclear macrophage system.
6. Immunity-Humoral and Cellular, disorders, organ transplant.

V. Cardio-vascular System

1. Generation and conduction of cardiac impulses.
2. E.C.G. Cardiac Arrhythmias, heart rate and its regulation.
3. Cardiac cycle with reference to pressure, volume changes, heart sounds, Sphygmogram and Phlebogram.
4. Cardiac output and its regulation.
5. Haemodynamics, nervous and chemical control of blood vessels.
6. B.P and its regulation. Hypo and hypertension.
7. Regional Circulation.
8. Cardio-respiratory changes during exercise and cardiac performance during exercise.
9. Classification and pathophysiology of shock with emphasis on hemorrhagic shock.
10. Common circulatory disorders (coronary, cerebral etc.) and cardiac failure.

VI. Respiratory System

1. Mechanics of respiration, compliance, ARDS, IRDS.
2. Pulmonary volumes and capacities.
3. Pulmonary and alveolar ventilation.
4. Physical Principles of gaseous exchange.
5. Transport of respiratory gases.
6. Nervous and chemical regulation of respiration.
7. Hypoxia and acclimatization.
8. Cyanosis, Dyspnea, Caisson Disease, Asphyxia, Periodic Breathing.
9. Pulmonary function tests, obstructive and restrictive diseases of lung.
10. Effect of cigarette smoking on respiratory system as well as other systems of the body.

VII. Sports Physiology

1. Effect of training on various systems

VIII. Environmental Physiology

1. Aviation and space Physiology – A consolidated comprehensive and coordinated concept only to be given.
2. Hyperbaric environment.
3. Functions of skin and regulation of body temperature.
4. Hypothermia and hyperthermia.

IX. Endocrines.

1. Mechanism of action of hormones.
2. Physiology of pituitary, thyroid, parathyroid, pancreas, adrenal-cortex and medulla, thymus and pineal gland.
3. Regulation of secretion of endocrine glands.
4. Disorders of endocrine glands.
5. Assessment of endocrine activity.

X. Reproduction

1. Menarche, puberty and menopause.
2. Physiology of testes and ovaries.
3. Physiology of menstruation, pregnancy and lactation.
4. Physiology of growth.
5. Physiological basis of contraception.

XI. Central Nervous System

1. Cerebrospinal fluid.
2. Physiology of synapse and receptor organs.
3. Physiology of reflex action and muscle spindle.
4. Sensory and motor tracts, physiology of pain.
5. Effects of sections of spinal cord at various levels.
6. Regulation of posture and equilibrium,
7. Role of cerebellum, basal ganglia and vestibular apparatus in tone, posture and equilibrium. Disorders of movements and Parkinson's Disease.
8. Physiology of thalamus, hypothalamus and limbic system.
9. Sensory and motor cortex, physiology of voluntary movements.
10. Reticular formation, sleep and wakefulness, learning, memory, speech, language and Alzheimer's disease.
11. Autonomic nervous system-peripheral and central mechanism.

XII. Special Senses.

1. Physiology of taste and smell.
2. Ear-conduction of sound waves, peripheral and central mechanism of hearing and auditory pathways.
3. Eye-refractory media and protective mechanism in eye.
4. Formation, circulation and functions of aqueous humour.
5. Physiology of optics, photochemistry of vision and colour vision.
6. Visual pathway and effects of lesions at various levels.

Applied Physiology is explained in the form of case study after completion of each system. The cases are discussed in the class or given for self-learning as problem based learning.

PRACTICALS

I. Haematology

1. Total and differential W.B.C Counts, Absolute count.
2. Total R.B.C count, Hb estimation, P.C.V. and E.S.R.
3. Bleeding, Clotting time and Blood Group determination.

II. Clinical Physiology

1. Examination of Alimentary System
2. Examination of Cardiovascular system including pulse.
3. Examination of Respiratory system, TPR.
4. Cardiac Efficiency and Respiratory Efficiency Tests.
5. Artificial Respiration, CPR principle, Heimlich Manoeuvre.
6. Examination of CNS-Higher functions.
7. Examination of Cranial Nerves.
8. Examination of Motor Function & Reflexes.
9. Examination of Sensory System.
10. Examination of Special Senses.

III. Human Physiology

1. Recording of B.P, effects of posture, exercise and cold stress on B.P.
2. Stethography and factors affecting respiration.
3. Spirometry.
4. Perimetry.
5. Measurement of reaction time to visual and auditory stimuli.
6. Respiratory Function Tests – Flow Volume Loop, Flow Rates;MVV

DEMONSTRATIONS

I. Haematology

1. Platelet count and Reticulocyte count.

II. Experimental

1. Simple Muscle Curve. Effect of two successive stimuli, genesis of tetanus.
2. Effect of free and after load, Starling's law and work done. Fatigue in skeletal muscle.
3. Effect of drugs-acetyl choline, adrenaline and nicotine on heart.
4. Perfusion of mammalian heart and plain and effect of various ions.
5. Study of record of mammalian blood pressure and respiration and factors influencing it.

III. Human experiments.

1. Reaction time in human knee jerk.
2. Strength duration curve.
3. E.C.G.
4. E.M.G.
5. E.E.G.
6. Pregnancy test.
7. Human-Ergography and effect of rest pause.
8. Ophthalmoscopy and dark adaptation.

ELECTIVES

Electives to be conducted in the second term during the practical period (total 30 hours). Meant to inculcate in the students, the quest for search and solutions. Simple projects to be worked out by the students in small groups (8 to 10) guided by the teachers. At the end of the period, present the findings and conclusions in the form of a scientific session.