Physiology

About Department

GOAL: The broad goal of the teaching of undergraduate students in physiology aims at providing the student comprehensive knowledge of normal functions of body and to facilitate the understanding of physiological basis of health and disease.

OBJECTIVES:

A) Knowledge:- At the end of the course the student shall be able to

1. Understand the functions of all organ system and their interactions.
2. Assess relative contribution of each organ system in maintenance of milieu interior
3. Describe physiological response and adaptation to environmental stress.
4. List the physiological principles underlying pathogenesis and treatment of diseases.

B) SKILLS :-At the end of the course the student shall be able to

1. Conduct experiments/Investigations designed for study of physiological phenomenon
2. To interpret experiments/ Investigations data
3. Distinguish between normal and abnormal data derived as result of test done in lab.

C) Integration:- At the end of the course the student shall be able to

acquire an integrated knowledge of organ, structure, function, and its regulatory mechanism and apply the knowledge in understanding of disease and its treatment.

Infrastructure

The department has enough space to accommodate 100 students.

- Lecture theater and one demonstration room of required capacity and equipped with audiovisual aids.
- Well-equipped hematology, clinical physiology, amphibian physiology, mammalian physiology with adequate seating capacity and preparation rooms.
- Well-equipped research laboratory having Gas analyzer & Bicycle ergograph for exercise physiology, NCV/EMG machine, Computerized pulmonary function testing machine, Polygraphs, Three & single channel physiography, Colorimeter, pH meter.
- Departmental library having more than 100 books, along with one international & two national journals, seminar room with audio-visual aids.
- Separate chambers for teaching and paramedical staff.
- Department has dedicated fulltime faculties (as private practice of any kind is not permissible as per recruitment rules of RUHS).

- Ongoing research work within the department:
    - A comparative study of visual evoked potential and effect of relaxation technique in patients with migraine and age matched controls.
    - Effect of integrated approach of yoga therapy on carotid intima media thickness, heart rate variability & biochemical parameters in prediabetes.
    - Role of yoga in peripheral and autonomic nerve functions in prediabetic subjects.

Subject Curriculum:

THEORY

- **General:**
    1. Cell physiology
    2. Homeostasis
    3. Transport across cell membrane
    4. Biophysics-general principles
    5. Body fluid compartment
    6. Related topics & applied physiology

- **Blood:**
    1. Composition, properties and functions of blood
    2. RBCs - their formation & functions
    3. Hemoglobin
    4. Anemia and blood indices
    5. Leukocytes - formation and functions
    6. Thrombocytes and hemostasis, Blood Coagulation
    7. Plasma proteins & E.S.R.
    8. Lymph and R.E. System
    9. Blood groups
    10. Immunity
    11. Blood Volume
    12. Related topics & applied physiology

- **Nerve & Muscle Physiology :**
    1. Membrane potential & action potential
    2. Structure & classification of nerve fibers
    3. Properties of nerve cells and their fibers (including Degeneration & Regeneration)
    4. Neuromuscular transmission
    5. Structure, functions and properties of muscles
    6. Mechanism of contraction of different types of muscles
    7. Physiological changes during muscle contractions
    8. Related topics & applied physiology

- **Gastrointestinal tract :**
    1. PhysiologicalAnatomy

2. Secretion & their control-Salivary, Gastric, Pancreatic, Intestinal
3. Bile, liver function tests & Jaundice
4. Digestion
5. Absorption
6. Movements of Gastrointestinal tract
7. Hormones of GIT
8. Related topics & applied physiology

- **Respiration System :**
  1. Physiological anatomy of respiratory tract
  2. Mechanics of respiration (including pressure & volume changes)
  3. Lung volume, capacities and lung function tests
  4. Composition of respiratory gases
  5. Transport of Oxygen in Blood
  6. Transport of Carbon dioxide in Blood
  7. Regulation of respiration
  8. Hypoxia, Asphyxia
  9. Cyanosis and periodic breathing
  10. Dysbarism and acclimatization to high altitude
  11. Exercise and space Physiology
  12. Related topics & applied physiology

- **Cardiovascular System :**
  1. Functional anatomy of heart
  2. Origin and spread of cardiac impulse
  3. Cardiac cycle & heart sounds
  4. Electrocardiogram
  5. Heart rate
  6. Cardiac output & venous return
  7. Arterial blood pressure
  8. Arterial and venous pulse
  9. Circulation –Capillary, coronary, pulmonary and systemic circulation
  10. Hemorrhage, Hypovolemic shock
  11. Cardiovascular changes during exercise and cardiac efficiency tests.
  12. Related topics & applied physiology

- **Excretory System :**
  1. Physiological anatomy of Kidney
  2. Renal Circulation
  3. Glomerular filtration rate
  4. Functions of renal tubules
  5. Reabsorption of physiologically important substances
  6. Counter current mechanism
  7. Hormonal function of Kidney
  8. Role of kidney in acid-base balance in body
  9. Micturition

10. Renal function tests
11. Functions of skin
12. Regulations of body temperature
13. Related topics & applied physiology

- **Central & Peripheral Nervous System:**
  1. Introduction
  2. Synapse and synaptic transmission
  3. Autonomic nervous system (including Adrenal medulla)
  4. Sensory system- receptor & their properties, sensations
  5. Spinal Cord : Tracts and lesions
  6. Reflexes
  7. Motor organization
  8. Brain stem (including vestibular apparatus)
  9. Basal Ganglia
  10. Cerebellum
  11. Tone, posture and equilibrium
  12. Motor control mechanism
  13. Thalamus
  14. Hypothalamus
  15. Limbic cortex
  16. Cerebral cortex
  17. Higher functions-Speech, Learning and memory
  18. Electroencephalogram and sleep
  19. Cranial Nerves
  20. Pain
  21. CSF
  22. Related topics & applied physiology

- **Special Senses :**
  1. Structure of eye
  2. Refractory Errors of Eye and corrections
  3. Retina : Structure, photochemistry
  4. Visual pathways and its lesions
  5. Visual activity and binocular vision
  6. Accommodation and adaptations to darkness
  7. Color Vision
  8. Visual perceptions : Central mechanism
  9. Movements of eye
  10. Functional anatomy of ear
  11. Structure and functions of middle ear
  12. Organ of Corti and mechanism of hearing
  13. Endocochlear potentials and auditory pathways
  14. Deafness and tests of hearing
  15. Taste and smell

- **Endocrinology and Reproductive Physiology :**
    1. Introduction
    2. Hypothalamohypophyseal axis
    3. Anterior pituitary gland (including growth and development)
    4. Posterior pituitary gland
    5. Thyroid gland
    6. Hormonal control of blood calcium level
    7. Endocrine pancreas
    8. Andrenal gland
    9. Hormones of heart, kidney and thymus
    10. Introduction to reproductive physiology
    11. Male reproductive system : structure, functions
    12. Female reproductive system : structure, functions & reproductive cycles
    13. Fertilization, placenta, pregnancy and pregnancy tests
    14. Parturition and lactation
    15. Physiological basis of family planning
    16. Related topics & applied physiology

BIOPHYSICS:

- Principles of biophysics and its applied aspects
- Biopotentials and its applied aspects
- Transport across cell membrane
- Related applied topics

ENVIRONMENTAL, REGULATORY & EXERCISE PHYSIOLOGY:

- Physiology of high altitude, acclimatization & effect of high atmospheric pressure
- Aviation & space physiology
- Body temperature regulation, Hypo & Hyperthermia
- Physiology of exercise & yoga

PRACTICALS

- **General Practical:**
    1. Study of appliances - Experimental instruments
    2. Study of appliances - Hematology and clinical instruments
    3. Study of appliances - Compound microscope

- **Hematology Practical:**
    1. Estimation of hemoglobin
    2. Hemocytometry
    3. Total white cell count (TLC)
    4. Total red cell count (TRBC)
    5. Peripheral blood film
    6. Differential WBC count (DLC)
    7. Platelet count
    8. Absolute eosinophil count, Arneth count
    9. Packed cell volume & Erythrocyte sedimentation rate
    10. Blood indices and related calculation
    11. Blood grouping
    12. Determination of BT & CT
    13. Effect of tonicity of saline, Osmotic fragility
    14. Hemin crystals, reticulocyte count

- **Clinical Physiology Practical:**
    1. Radial pulse
    2. Arterial blood pressure
    3. Effect of exercise & posture on arterial blood pressure
    4. Cardiac efficiency tests
    5. ECG
    6. Spirometry
    7. Stethography
    8. Examination of sensory functions
    9. Examination of motor functions
    10. Examination of cranial nerves
    11. CNS higher functions
    12. Thermometry
    13. ErgographyClinical examination in general
    14. Clinical examination of Cardiovascular system
    15. Clinical examination of Respiratory system
    16. Clinical examination of abdomen
    17. Artificial respiration and Cardio pulmonary resuscitation

- **Amphibian practicals**
    1. Gastrocnemius muscle, sciatic nerve preparation

2. Simple muscle curve,
3. Effect of temperature on SMC
4. Effect of load on SMC
5. Effect of two successive stimuli
6. Genesis of tetanus
7. Phenomenon of Fatigue
8. Velocity of nerve impulse
9. Perfusion of amphibian heart
10. Frog's heart beat & Effect of temperature on frog's heart
11. Properties of cardiac muscle
12. Effect of vagal stimulation and phenomena of vagal escape
13. Effect of drugs & ions on frog's heart
14. Perfusion of isolated amphibian heart
15. Quantal summation & Strength duration curve

TUTORIALS

1. Hemoglobin
2. Blood groups
3. Neurons and Neuroglia
4. Rigor mortis & Myasthenia gravis
5. Lymph & R.E. System
6. Radial pulse Tracing
7. Bleeding Disorders
8. Isotonic & Isometric contraction
9. Hypoxia, O2 therapy & cyanosis
10. Deglutition and vomiting
11. Emptying of stomach & peristalsis
12. Movements of small & large intestine, Defecation
13. Skin – structure & function
14. Asphyxia, Hypercapnia
15. O2 & CO2 dissociation curve, periodic breathing
16. Acidification of urine, role of kidney in pH regulation
17. Adrenal Medulla
18. Cutaneous Circulation
19. E.C.G.
20. Speech and Aphasia

SEMINAR TOPICS OF PHYSIOLOGY

S.No.	SEMINAR TOPIC
1	FUNCTIONS OF BLOOD
2	PLATELETS AND ITS FUNCTION
3	ANAEMIA
4	POLYCYTHEMIA
5	ERYTHROPOIESIS
6	ANTICOAGULANTS
7	MECHANISM OF CLOTTING
8	IMMUNITY
9	LYMPH
10	SARCOMERE
11	MECHANISM OF SKELETAL MUSCLE CONTRACTION
12	PROPERTIES OF SKELETAL MUSCLE
13	NEUROMUSCULAR JUNCTION
14	CLASSIFICATION OF NERVES
15	RESTING MEMBRANE POTENTIAL & ACTION POTENTIAL
16	MECHANISM OF CONTRACTION IN SMOOTH MUSCLE
17	EXCITATION-CONTRATION COUPLING OF SMOOTH,SKELETAL,AND CARDIAC MUSCLE
18	CARDIAC CYCLE
19	HEART SOUNDS
20	B.P-SHORT TERM REGULATION
21	B.P-LONG TERM REGULATION
22	CARDIAC OUTPUT
23	VENOUS RETURN
24	PERIPHERAL RESISTANCE
25	CORONARY CIRCULATION

Staff Information

Dr. SudhanshuKacker	Professor& Head
Dr. Rajprabha	Associate Professor
Dr. Reshu Gupta	Assistant Professor
Dr. NehaSaboo	Assistant Professor
Dr. Anshul Sharma	Tutor
Dr. Madhvika Shah	Tutor
Dr. Mahima Sharma	Tutor
Dr. Madhuri Sharma	Tutor