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
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. Physiological Anatomy
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. Ergography
  14. Clinical examination in general
  15. Clinical examination of Cardiovascular system
  16. Clinical examination of Respiratory system
  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
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<tr>
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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