Anatomy and Physiology

Total: 4 hours /week
Lecture: 4 hours/week
Tutorial: 0 hour/week
Practical: 0 hours/week
Lab: 0 hours/week

Course description

This course provides basic knowledge of the normal structure and function of the systems of the human body. The content prepares the student to understand how the body system works together and its relation among all body systems.

Objectives

After completion of this course the student will be able to:

- Identify the different parts of the human body.
- Describe the structure of different parts of human body.
- Explain the interrelationship of the body systems.
- Explain the physiology of different systems.

Unit 1: System Approach to the Human Body **10 hrs**

- Definition of Anatomy, physiology; various suffix and prefix used in anatomy and physiology
- Define different terminologies used in various systems
- Main cavities: Cranial, thoracic, abdominal, and pelvic.
- Anatomical position of the body: anterior, posterior superior, inferior, proximal, distal, dorsal, ventral, palmer, lateral, supine, prone, Range of motion: Flexion, extension, abduction, adduction, rotation, circumduction, supination, pronation, opposition,

Unit 2: Introduction to cells and tissues **8 hrs**

- The structure and functions of human cell
- Cell division: Mitosis, Meiosis
- The structure and function of tissues: Epithelial tissue, connective tissue, muscular tissue, nervous tissue
- Structure and functions of membranes, gland, cartilage

Unit 3: Body Fluid and Electrolyte **20 hrs**

- Body fluid and electrolyte
  - Fluid and electrolyte distribution
    - Intracellular fluid
    - Extracellular fluid
  - Important function of body fluid
  - Body fluid and electrolyte balance
  - Importance of fluid and electrolyte balance in health
- Acid base balance
  - Definition of acid and base

- Mechanism to maintain acid base balance
- Respiratory system
- Urinary system
- Buffer mechanism

- Fluid and electrolyte imbalances
  - Different conditions related to fluid and electrolyte imbalance
    - Dehydration/ Over hydration
    - Hypo/Hyperkalemia
    - Hypo/Hypernatremia
    - Hypo/Hypercalcemia
    - Hypo/Hypermagnesemia
    - Ways of replacement
    - Oral rehydration therapy
    - Naso-gastric feeding
    - Intravenous therapy: Types of rehydration solution
      - Hypertonic
      - Hypotonic Isotonic

Unit 4: Introduction to Circulatory System **10 hrs**

- Circulatory system
  - Structure and functions of heart
  - Cardiac cycle
  - Conduction system
  - Heart sound
  - Normal blood flow
  - Blood
    - Composition of blood: Cells, Plasma, Coagulation factors
    - Functions of blood
    - Blood grouping and Rhesus factor
- Blood Vessels
  - Structure and Function of blood vessels
  - Main blood vessels and their branches
  - Blood Pressure
  - Pulse
- Different kinds of circulation
  - Pulmonary circulation
  - Systematic circulation
  - Portal circulation
  - Fetal circulation

Unit 5: Introduction to Lymphatic System **8hrs**

- Structure and function of lymphatic system
- Lymphatic vessels
- Lymphatic organs and tissue

- Lymph nodes
- Spleen
- Thymus
- Tonsils/ Peyer's patches
- Immunoglobulin and its types

Unit 6: Introduction to Muscular System **8 hrs**

- Types, structure and functions of muscles
  - Voluntary
  - Involuntary
  - Cardiac
- Principal skeletal muscle
  - Muscles of the face, neck, trunk, shoulder and upper limb, hip and lower limb, pelvic floor
  - Action of the muscles in relation to force

Unit 7: Introduction to Skeletal System **10hrs**

- Definition: Bone, Joint
- Development of bone
- Suture and fontanelles
- Types and function of Bones
  - Long/short/flat/irregular/sesamoid
- Classification of skeleton
  - Axial/ Appendicular
- Types and function of joints
  - Fixed/cartilaginous/synovial
  - Mechanism of joint movement and its relation to the principles of lever
- Types/structure/functions of teeth
  - Temporary/ Permanent
- Types of movement of bones
- Types of sinuses
  - Frontal/sphenoid/Ethmoid /Maxillary
  - Disorders (Introduction only)
  - Osteoporosis, Rickets, Osteomalasia, Osteomylitis, Piget's disease, Tumors of bone, Arthritis, Carpel Tunnel syndrome
  - Fracture

Unit 8: Introduction to Respiratory System **10 hrs**

- Structure and function of different parts of respiratory organs
- Nose and nasal cavity, Sinuses, Pharynx, Larynx, Trachea, Lungs, Bronchi and Bronchioles, Alveoli

- Respiratory muscles: Intercostal muscle and Diaphragm
- Physiology of respiration
    - External respiration
    - Internal respiration
    - Exchange of gases
    - Respiration in relation to Boyle's law
- Capacity of lung: tidal volume, inspiratory reserve volume, Inspiratory capacity, functional residual capacity, Expiratory reserve volume, residual volume, vital capacity,

Unit 9: Introduction to Digestive System **6 hrs**

- Definition
    - Digestion
    - Digestive system
- Structure and function of digestive organs involved in digestive system: Mouth, Oesophagus, Stomach, Small intestine, Large intestine, Rectum, Anus
- Structure and function of and its accessory organs: Pairs of salivary glands, pancreas, liver, biliary duct
- Types/structure/functions of teeth
    - Temporary/ Permanent
- Functions of digestive system
- Physiology of digestion

Unit 10: Introduction to Urinary System **8 hrs**

- Structure and function of organs related to urinary system
    - Kidney
    - Ureter
    - Urinary bladder
    - Urethra
- Composition and mechanism of urine formation
    - Glomerular filtration
    - Selective reabsorption
    - Tubular secretion
- Mechanism of micturition

Unit 11: Introduction to Nervous System **8hrs**

- Introduction, nerve, neuroglia, synapse, nerve transmission
- Types of nerves
- Mechanism of stimuli transmission
- The central nervous system
    - Covering membrane (meninges)

- Cerebrum
- Mid brain
- Cerebellum
- Brain stem
- Ventricles
- Spinal cord

- The peripheral nervous system
    - Spinal nerve
    - Cranial nerve
    - Autonomic nervous system
- Neurons'
    - Mechanisms of stimuli transmitted in the nervous system –Reflex action
        - CNS- Brain and Spinal cord
        - PNS-Spinal cord and cranial nerves
        - ANS- Sympathetic and parasympathetic system

Unit 12: Introduction to Reproductive System **10 hrs**

- Female reproductive organ
    - Structure and functions of external and internal reproductive organs.
    - Primary and secondary sex characteristics
    - Mechanism of:
        - Puberty
        - Menstruation cycle.
        - Fertilization: Spermatogenesis, Oogenesis, Conception
    - Menopauseh
- Structure and function of mammary gland
- Male reproductive organs
    - Structure and function of male reproductive organs
    - Primary and secondary sex characteristics
    - Puberty

Unit 13: Introductions to Endocrine System **10hrs**

- Structure and function of endocrine glands and its hormones
- Hormone produced by different glands and its functions
- Male and female sex hormones
    - Oestrogen
    - Progesterone
    - Testosterone
    - Other hormones

Unit 14: Introductions to Special Sensory Organ **6 hrs**

- Structure and function of the skin
    - Sensation

- Regulation of body temperature:
- Conduction
- Convention
- Radiation
- Excretion

- Protection of body structure and immunity
- Sensory organ: Eye
    - Location of the eye
    - Structure and function of the eye
    - Eye accommodation
    - Visual pathway
- Structure and function of Ear (Adult and Child)
    - Location of the ear
    - Structure of the ear
    - Function of the ear
- Nose and Throat: Structure and function (Review from respiratory system)
- Tongue: Structure and function (review from digestive system)

Unit15: Human Growth & Development **8hrs**

- Terms related to growth and development:
    - Foetal circulation and neonatal changes.
    - Characteristics of the stages of life development:
        - neonatal
        - infancy
        - childhood
        - adulthood
- Causes of aging.

References Books:-

- Wangh and Grant, A, Ross and Wilson. Anatomy and Physiology in Health and Illness 2nd ed. (2006): Churchill Livingstone Elsevier.
- Tuitui R, Suwal SN (2018). Human Anatomy and Physiology. Vidharthi Publication, Bhotahity, kathmandu
- Anotomy & Physiology, Surya Publication
- Chevalking H, Tuladhar K, Shrestha U. Integrated Science Related to Health, (2005); HLMC, IOM.
- Windood, R.S., Sear's. Anatomy and Physiology for Nurses (1985): English Language Book Society.
- Text book of Anatomy & Physiology, Akshav Publication.

Final written exam marking scheme

Unit	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**Total**
Unit Hours	**10**	**8**	**20**	**10**	**8**	**8**	**10**	**10**	**6**	**8**	**8**	**10**	**10**	**6**	**8**	**140**
Marks	**6**	**5**	**10**	**6**	**5**	**5**	**6**	**6**	**2**	**5**	**5**	**6**	**6**	**2**	**5**	**80**