

# Anatomy & Physiology 1<sup>st</sup> Semester Outline

## Unit 1 Anatomical Terminology

### 1. Directional Terms

- Superior/Inferior
- Anterior/Posterior
- Cranial/Caudal
- Ventral/Dorsal
- Medial/Lateral
- Bilateral/ipsilateral/contralateral
- Proximal/distal
- Superficial/deep

### 2. Anatomical Planes

- Sagittal (medial)
- Frontal (coronal)
- Transverse (horizontal)
- For cylindrical structures: cross, oblique, longitudinal sections

### 3. Abdominal Regions (9)

- Right hypochondriac      epigastric      left hypochondriac
- Right lumbar (lateral)      umbilical      left lumbar (lateral)
- Right inguinal (iliac)      pubic (hypogastric)      left inguinal (iliac)

### 4. Abdominal Quadrants (4)

- Right upper quadrant      Left upper quadrant      Right lower quadrant      Left lower quadrant

### 5. Body Regions

Plantar	Tarsal	Inguinal	Gluteal
Abdominal	Frontal	Crural	Genital
Nasal	Carpal	Buccal	Occipital
Oral	Palmar	Mental	Dorsal
Cervical	Digital	Sternal	Cubital
Otic	Antebrachial	Orbital	Pedal
Acromial	Femoral	Pectoral	Lumbar
Brachial	Perineal	Coxal	Popliteal
Antecubital	Cephalic	Sural	Mammary
Calcaneal	Plantar	Umbilical	Sacral
Axillary	Patellar		

### 6. Different types of Imaging

- Radiographies (x-rays, fluoroscopy, angiograms)
- MRI
- CT scan
- PET
- Ultrasound

### 7. Body Cavities

#### A. Posterior (dorsal) Cavities: (1) Cranial cavity (2) Vertebral canal

- Meninges

#### B. Ventral Cavities:

1. Thoracic cavity: Mediastinum, Pleural Cavities (2) Pericardial Cavity
  - Membranes: pleural membranes & pericardium (parietal and visceral)
2. Abdominopelvic cavity: abdominal cavity & pelvic cavity
  - Membranes: peritoneum (parietal and visceral)

#### C. Cavities within the head

- Oral cavity
- Nasal cavity (Frontal sinuses & Sphenoid sinuses)
- Orbital cavity (Middle ear cavity)

### 8. Homeostasis (positive and negative feedback)

## Unit 2 Chemistry Basics

1. 6 main **elements** that make up human body
2. **Atomic structure** (proton, neutrons, atomic mass, electrons)
3. **Isotopes**
  - a. What can they be used for?
  - b. Solve a radioactive isotope half-life problem
4. **Molecules, Compounds, Isomers**
5. Types of **Chemical Bonds (ionic, covalent, hydrogen, van der Waals forces)**
6. **Electrolytes**
7. **Water**
  - a. Why water is good at dissolving things
  - b. Adhesion & Cohesion
  - c. Involvement in Chemical reactions
  - d. Thermal Stability
8. **Acids, Bases, PH**
  - a. What are they?
  - b. What does pH measure?
  - c. What is the purpose of a buffer?
9. **Chemical Reactions**
  - a. Types (Decomposition, Synthesis, Exchange)
  - b. What affects rate of reaction (Concentration, Temperature, Catalysts)

## Macromolecules (Carbon Compounds)

- Why is carbon main component of all organic molecules?
  - Polymer vs monomer
  - Dehydration synthesis (condensation) vs. Hydrolysis
1. **Carbohydrates**
    - a. Hydrophilic
    - b. Basic formula
    - c. Types
      - i. **Monosaccharides** (Glucose, Galactose, Fructose)
      - ii. **Dissacharides** (Sucrose, Lactose, Maltose)
      - iii. **Polysaccarides** (Glycogen, Starch, Cellulose (Benefits of **Fiber**))
    - d. **Glycemic Load**
  2. **Proteins**
    - a. Made of **Amino Acids** (central carbon with Amino group, carboxyl group, and **R- variable group** which makes 20 amino acids different)
    - b. **Functions** (Structure, Communication, Membrane Transport, Enzymes, Recognition/Protection, Movement, Cell Adhesion)
    - c. **Peptide and Peptide bonds**
    - d. Protein **Structure** crucial to function (primary, secondary, tertiary, quaternary)
    - e. Structure of Hair
    - f. **Denaturation**
    - g. **Enzymes**
      - i. Purpose and how they work
      - ii. Reused, astonishing speed
      - iii. Factors affecting function (pH, Temp, Inhibitor molecules ( Competitive vs noncompetitive), Cofactor)
      - iv. Lactose intolerance
  3. **Lipids**
    - a. Hydrophobic
    - b. More calories per gram (9 vs 4)
    - c. 3 main types
      - i. **Triglycerides**
        1. 3 Fatty Acids + glycerol
        2. Energy Storage, binds organs together, cushions organs
          - a. Saturated Fatty acids, Unsaturated, Polyunsaturated
          - b. Essential Fatty Acids
          - c. Trans-fatty acids
      - ii. **Phospholipids**
        1. Structure: 2 fatty acid chains + glycerol+ phosphate
        2. Hydrophilic head and hydrophobic tails
        3. Function?
      - iii. **Steroids**
        1. Cholesterol
          - a. LDL vs HDL

4. **Nucleic Acids**
  - a. 3 components of nucleotides
  - b. Polymers of nucleotides (DNA & RNA)
  - c. ATP

### **Unit 3 Cell and Cell Membrane**

1. **Cell Organelle** (plant and animal) functions
2. **Cell Membrane**
  - a. **Structure**
    - i. phospholipid bilayer (fatty acid tails & phosphate heads)
    - ii. integral & peripheral proteins
    - iii. glycoproteins and glycolipids
    - iv. cholesterol
  - b. **Types of Transport**
    - i. **Passive Mechanisms**
      1. Simple Diffusion
      2. Facilitated Diffusion
      3. Osmosis (Hypotonic, hypertonic, isotonic)
      4. Filtration
    - ii. **Active Mechanisms** (Active Transport & Vesicular Transport)
2. **Cell cycle and Mitosis**
  - a. Why do cells need to divide?
  - b. Stages of the Cell cycle
    - i. Interphase
    - ii. Mitosis (prophase, metaphase, anaphase, telophase)
  - c. Cancer and the cell cycle

### **Unit 4 Tissues**

1. **Epithelial (8 Types): general structure and function of epithelial tissue & structure/function of each type**
  - a. Simple squamous, simple cuboidal, simple columnar
  - b. Stratified squamous, stratified cuboidal, stratified columnar
  - c. Pseudostratified columnar
  - d. Transitional
2. **Connective Tissue (11 types): general structure and function of connective tissue**
  - 3 major cells: fibroblasts, mast cells, macrophages
  - Fibers: collagen, reticular, elastin
  - a. **True (proper) Connective Tissue**
    - i. **Loose Connective Tissue**
      1. Areolar
      2. Adipose
      3. Reticular
    - ii. **Dense Connective Tissue**
      1. Dense regular
      2. Dense irregular
  - b. **Supportive Connective Tissue**
    - i. **Cartilage**
      1. Hyaline
      2. Elastic
      3. fibrocartilage
    - ii. **Bone**
      1. Spongy
      2. compact
  - c. **Fluid Connective Tissue**
    - i. **Blood**
3. **Muscular Tissue (3 types) basic structure and function of each**
  - a. Skeletal
  - b. Smooth
  - c. Cardiac
4. **Nervous Tissue (2 types) basic structure and function**
  - a. Neurons
  - b. Neuroglial cells

## **Unit 5 Integumentary System**

1. Basic structures and functions of epidermis, dermis, and hypodermis
2. Epidermis
  - a. Layers and how its made
  - b. What determines skin color of the epidermis (melanin, carotene, hemoglobin)
3. Accessory structures
  - a. Nails
  - b. Hair and hair follicles
  - c. Skin glands (sebaceous & sweat: merocrine vs apocrine)
4. Regulation of body temperature by the integumentary system
5. Wound Healing
6. Burns (1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>)
7. 3 basic types of Skin Cancer (basal cell carcinoma, squamous cell carcinoma, malignant melanoma)
8. Effect of aging on Integumentary system
9. Issues with Integumentary system: Albinism, jaundice, cyanosis, vitiligo, acne, hypertrichosis, viral infections (herpes & warts caused by HPV)