TOPIC OUTLINE – IPHY 3410 sec. 1 (Leif Saul)

ANATOMY BASICS

I. Basic concepts of anatomy
    a. Spatial terminology
        1. Anatomical position
        2. Body regions
        3. Directional terms
        4. Planes
    b. Structural hierarchy
        1. All living organisms are made of cells
        2. Cells are grouped into tissues
        3. Different tissues combine to form an organ
        4. Different organs combine to form organ systems

II. Cells
    a. Size and shape
    b. Anatomy of a cell
        i. Plasma membrane
        ii. Cytoplasm
            A. Cytosol
            B. Organelles
        iii. Nucleus
    c. Cell junctions

TISSUES

I. Epithelium
    a. Introduction
    b. General characteristics
    c. Functions
    d. Classification
        A. Simple epithelium
            1. Simple squamous
            2. Simple cuboidal
            3. Simple columnar
            4. Pseudostratified columnar
        B. Stratified epithelium
            1. Stratified squamous
            2. Stratified cuboidal
            3. Stratified columnar
            4. Transitional
    e. Glands
        1. Exocrine
        2. Endocrine

II. Connective tissue
    a. Characteristics
    b. Functions
    c. Structure
        1. Cells
        2. Matrix
            A. Fibers
            B. Ground substance
    d. Categories of connective tissue
        1. Connective tissue proper
            A. Loose connective tissue
            B. Dense connective tissue
        2. Cartilage
            A. Introduction
            B. Types
        3. Bone
        4. Blood

BODY CAVITIES AND MEMBRANES

I. Body cavities
    a. Open body cavities
    b. Closed body cavities
        1. Dorsal body cavity
        2. Ventral body cavity
II. Introduction to membranes
    a. Definition
    b. Membrane composition
    c. Functions
III. Types of membrane
    a. Mucous membrane
    b. Serous membrane
    c. Cutaneous membrane

INTEGUMENTARY SYSTEM

I. Structure of the skin
    a. Epidermis
        1. Stratum germinativum
        2. Stratum spinosum
        3. Stratum granulosum
        4. Stratum lucidum
        5. Stratum corneum
    b. Dermis
        1. Papillary layer
        2. Reticular layer

c. Hypodermis (NOT part of skin)
II. Appendages of the skin
a. Hair and hair follicle
b. Glands

BONES AND BONE TISSUE

I. Introduction
a. Fun facts
b. Functions of bones
II. Gross structure of a long bone
III. Histology of bone tissue
a. General
1. Cells
2. Matrix
b. Compact bone
c. Spongy bone
d. Woven bone
IV. Bone formation and growth
a. Intramembranous bone formation
b. Endochondral bone formation
c. Bone growth
V. Bone disorders
a. Achondroplasia
b. Osteoporosis
c. Osteomalacia

JOINTS

I. Introduction
a. Definition
b. Degrees of mobility
c. Joints can change with age
II. Joint classification
a. Fibrous joints
1. Suture
2. Syndesmosis
3. Gomphosis
b. Cartilaginous joints
1. Synchondrosis
2. Symphysis
c. Synovial joints
III. Anatomy of synovial joints
a. Structures of the joint itself
b. Structures often associated with synovial joints
IV. Movements of joints

a. Introduction
    1. Terms of orientation in anatomy (review)
    2. Describing movements using planes & axes
b. Translational (linear) movements
c. Movements around an axis
    1. Angular movement
    2. Rotation

V. Synovial joints classified by shape
1. Plane joint
2. Hinge joint
3. Pivot joint
4. Condylar joint
5. Saddle joint
6. Ball-and-socket joint

VI. Joint health & pathology
a. Injuries
b. Joint stability
c. Diseases

MUSCLES AND MUSCLE TISSUE

I. Introduction to muscle
a. Functions
b. Special features of muscle tissue
c. Types of muscle tissue

II. Skeletal muscle
a. Introduction
    1. Attachments
    2. Actions
b. Basic anatomy
c. Microscopic anatomy
d. Mechanism of contraction

III. Cardiac muscle

IV. Smooth muscle

DIGESTIVE SYSTEM

I. Introduction
a. Function
b. Organs
c. Internal and external lining of GI tract

II. Structure of GI tract wall
a. Mucosa
b. Submucosa
c. Muscularis externa
d. Serosa

III. Steps in food processing
    a. Ingestion
    b. Mechanical breakdown and mixing
    c. Secretion
    d. Chemical digestion
    e. Absorption
    f. Propulsion
    g. Defecation
IV. Organs of the GI tract
    a. Mouth
    b. Pharynx
    c. Esophagus
    d. Stomach
    e. Small intestine
    f. Large intestine
V. Accessory digestive organs
    a. Liver
        1. Functions
        2. Gross anatomy
        3. Microscopic anatomy
        4. Pathology
        5. Summary of pathway of blood flow
    b. Gallbladder
        1. General features
        2. Pathway of bile flow
        3. Pathology
    c. Pancreas
        1. Gross anatomy
        2. Functions

RESPIRATORY SYSTEM

I. Introduction
    a. Function – 4 steps
    b. Zones
II. Wall of the conducting zone
III. Organs of the respiratory system
    a. External nose
    b. Nasal cavity
    c. Paranasal sinuses
    d. Pharynx
    e. Larynx
    f. Trachea
    g. Primary bronchi
    h. Lungs
        1. Introduction

2. Pleurae
3. Divisions
4. Bronchial tree
5. Respiratory zone

IV. Ventilation
1. Inspiration
2. Expiration

CARDIOVASCULAR SYSTEM

I. Introduction
a. Function
b. Circulatory routes
c. Circulatory principles

II. Heart
a. Introduction
b. Coverings
c. Wall
d. Chambers and vessels
1. Atria
2. Ventricles
e. Valves
1. Atrioventricular valves
2. Semilunar valves
f. Conducting system
1. Introduction
2. Sequence of conduction
3. Disorders

III. Blood

IV. Blood vessels
a. Introduction - Function of blood vessels
b. General structure of blood vessel wall
c. Arteries
1. Structure
2. Types
A. Elastic (conducting) arteries
B. Muscular arteries
C. Arterioles
d. Capillaries
1. Structure
2. Capillary beds
3. Types of capillaries
A. Continuous
i. In brain
ii. In most organs
B. Fenestrated

C. Discontinuous (sinusoids)

e. Veins
1. Structure
2. Types
3. Mechanisms of enhancing venous return

LYMPHATIC AND IMMUNE SYSTEMS

I. Lymphatic system
a. Function
b. Pathway of flow
c. Structures
d. Pathology

II. Immune system
a. Cells
1. Macrophages
2. Lymphocytes
b. Lymphoid tissues and organs

NERVOUS SYSTEM

I. Introduction
a. Function
1. Properties
2. Three basic functions
b. Organization

II. Histology
a. Neurons (nerve cells)
1. Properties
2. Anatomy of a typical (multipolar) neuron
3. Types of neurons
A. Functional classification
B. Structural classification
b. Support cells (neuroglia or glia)
1. Properties
2. Types
c. Histology of gross anatomy

III. Brain
a. Introduction
1. Complexity
2. Development
3. Cerebrospinal fluid
4. Meninges
b. Telencephalon (cerebrum)
1. Overview
2. Cerebral cortex

A. Introduction
B. Frontal lobe
C. Parietal lobe
D. Occipital lobe
E. Temporal lobe
F. Insula
3. White matter
4. Deep gray matter
c. Diencephalon
1. Thalamus
2. Hypothalamus
3. Epithalamus
d. Mesencephalon
e. Metencephalon
1. Pons
2. Cerebellum
f. Myelencephalon
1. Medulla oblongata
g. Functional brain systems
1. Reticular formation
2. Limbic system

IV. Spinal cord
a. Function
b. Anatomy
1. Gray matter
2. White matter
3. Meninges

V. Peripheral nervous system
a. Introduction
b. Spinal nerves & associated structures
c. Autonomic nervous system
1. Introduction
2. Sympathetic nervous system
A. General features
B. Neurotransmitters
C. Physiological responses
D. Adrenal medulla
3. Parasympathetic nervous system
A. General features
B. Neurotransmitters
C. Physiological responses
d. Sensory system

VI. Special senses (in detail)
a. Hearing and equilibrium
1. External ear
2. Middle ear

3. Internal ear
A. Bony labyrinth
B. Membranous labyrinth
C. Semicircular ducts
D. Saccule and utricle
E. Anatomy of cochlea
F. Pathway of sound sensation
G. Pathway of sound vibrations

b. Vision
1. Layers of the eye
A. Fibrous layer
B. Vascular layer
C. Inner layer (retina)
2. Segments of the eye
3. Neural pathway

URINARY SYSTEM

I. Introduction
a. Function
b. Components

II. Kidney
a. Gross anatomy
b. Microscopic anatomy
1. Introduction
A. Basic structure
B. Function
2. Renal corpuscle
3. Proximal convoluted tubule
4. Loop of Henle
5. Distal convoluted tubule
6. Collecting duct

REPRODUCTIVE SYSTEM

I. Introduction to anatomy