

Biology 152 — Fall 2002

Anatomy and Physiology for Nursing

INTRODUCTION

Biology 152 is the first half of a two-semester course on the anatomy and physiology of the human body with applications to clinical nursing practice. The course traces anatomy and physiology of cells, tissues and selected organ systems. Themes, which will be integrated in the course, include physical assessment, diagnostic testing, basic pharmacology, chronicity, nutrition and development.

INSTRUCTORS

Biology

Dr. Joan Mitchell Office: F252B Phone: 370-3465
email:mitchelj@camosun.bc.ca

Dr. Ahmed Vawda Office F342D Phone: 370-3479
email: vawda@camosun.bc.ca

Nursing

Eleanor McKenzie Office F106B Phone: 370-3235
email: mckenzie@camosun.bc.ca

TEXTS

Biology - Required

Martini, F. (2001). *Fundamentals of anatomy and physiology*. (5th Ed.) Upper Saddle River, NJ: Prentice Hall.

Martini, F. and Welch, K. (2001). *Applications Manual: Fundamentals of anatomy and physiology*. (5th Ed.) Upper Saddle River, NJ: Prentice Hall.

Camosun College, Department of Biology. *Biology 152: Course Outline, Learning Objectives and Laboratory Directions* — Fall 2002.

Optional

Seiger, C. (2001). *Study Guide: Fundamentals of anatomy and physiology*. (5th Ed.) Upper Saddle River, NJ: Prentice Hall.

*Kapit, W. and Elson, L. (2002). *The Anatomy Coloring Book*.
New York, NY: Harper & Row.

*or other similar publications

**Nursing – Required for students registered in nursing.
For others, texts are optional. Texts will be on reserve at the Lansdowne library.**

Dugas, B., Esson, L. & Ronaldson, S. (1999). *Nursing foundations: A Canadian Perspective*. (2nd Ed.) Scarborough, Ontario: Prentice Hall Canada Inc.

Estes, M. (2002). *Health assessment & physical examination*. (2nd Ed.) Toronto: Delmar Publishers.

Eisenhauer, L., Wemett, L., Spencer, R., & Burgan, F. (1998). *Clinical pharmacology & nursing management*. (5th Ed.) New York: Lippincott.

Lab requirements

1. Lab coats. Disposable lab coats are acceptable and can be used for the two semesters of biology.
2. Binder for laboratory modules and assignments with lined and blank loose-leaf paper.
3. Coloured pencils.

EVALUATION

Your progress in learning about human anatomy and physiology will be assessed on a continuous basis using a number of methods. Marks may be awarded for assignments, lab reports and/or class participation. There will be three theory examinations during the term, a midterm laboratory examination and final comprehensive theory and laboratory examinations. Theory examinations will include both the nursing and biology components of the course.

Exam # 1	.....	15%
Exam #2	.....	20%
Final comprehensive	.....	40%
Midterm Lab Exam	.....	10%
Final comprehensive Lab Exam	.....	<u>15%</u>
TOTAL		100%

Examinations will be given at times indicated on the Course Schedule. Assignments will be due at times as announced in class. Alternate times for examinations will only be granted for genuine emergencies, supported by documentation acceptable to the department. In the case of illness or emergency, the student must notify the instructor **in advance** of the examination in order for alternate arrangements to be made. *Note: Vacation plans do not constitute an emergency.* Please see STUDENT RESPONSIBILITIES.

A+	=	95% and over	C+	=	65% and over
A	=	90% and over	C	=	60% and over
A-	=	85% and over	D	=	50% and over
B+	=	80% and over	F	=	less than 50%
B	=	75% and over			
B-	=	70% and over			

STUDENT RESPONSIBILITIES

1. Students are expected to hand in any required reports on time.
2. Late reports will receive a penalty of 10% per day for each weekday. If a report is due on Friday, a penalty of 10% will be applied to Saturday/Sunday period.
3. Attendance is important to ensure success. If unable to attend a session, the student is responsible for arranging with a classmate to obtain information such as notes, handouts and announcements.
4. Examinations must be written as scheduled. Exceptions will be made at the discretion of the instructor and only if documentation of the illness or emergency acceptable to the department is received. The student must notify the instructor **in advance** of the examination.
5. If acceptable documentation for missing a theory examination is received, the student will be given the opportunity to write a makeup examination in week 13 which will be valued at the percentage allocated to the missed examination(s). This makeup examination will cover all material covered up to and including week 12.
6. If a student is unable to take the midterm laboratory examination and provides acceptable documentation, the mark allocated will be added to the final comprehensive laboratory examination.
7. If a student is unable to take the final laboratory examination and provides acceptable documentation, an oral laboratory examination will be given.
8. Any evaluation of work for in-class/lab assignments, reports and/or participation cannot be given if a student is not present for any reason.
9. Students are expected to work independently on reports unless instructed that the evaluation is based on group effort and evaluation. Please see **ACADEMIC MISCONDUCT**.

ACADEMIC MISCONDUCT

Academic misconduct includes but is not limited to the following acts:

- Giving unauthorized information to another student or receiving unauthorized information from another student during any type of examination or test.
- Obtaining or providing, without authorization, questions or answers relating to any examination or test prior to the time of the examination or test.
- Using unauthorized sources of information during any examination or test.
- Asking or arranging for another person to take any examination or test in one's place.
- Plagiarizing, that is, appropriating the work of another or parts or passages of another's writing, or the ideas or language of the same, and passing them off as the product of one's own mind or manual skill.

According to Camosun College policy, the consequence for academic misconduct is receiving a grade of 'F' for the work involved or for the course.

10. Students must know and follow all Safety Rules and Procedures.
11. Students must sign the Safety Contract before participating in any laboratory activity.
12. Failure to follow the Safety Rules and Procedures will result in penalties at the discretion of the instructor.
13. Students must turn off cell phones and pagers during all lectures and laboratories.
14. All laboratories start punctually. Information necessary for performing the laboratory correctly and safely is given at the beginning of the lab. Therefore, students are expected to arrive at the labs before the scheduled start times in order to be prepared to begin the lab on time.

NOTE – Concerning spelling

Anatomy is a logical and precise study of a complex subject. The terminology used to describe the body's features is similarly complex. Because the terms have been developed over a period of hundreds of years and were drawn from several languages, especially Latin and Greek, learning their correct usage is a formidable task.

Mastering the usage of these terms will be important to you for several reasons. Correct usage (pronunciation and spelling) will

- foster self confidence
- help to earn the respect of your professional colleagues
- reduce the chances of practical mistakes which may cause harm (or embarrassment – consider the difference between washing the peroneal area and the perineal area)

You will be expected to use acceptable pronunciation and spelling for presentations and evaluations. Penalties for spelling errors will be applied. If writing is illegible, no marks will be given.

The following schedule is **tentative**. Any changes will be announced in class.

Biology 152: COURSE SCHEDULE, FALL 2002

Week	Dates	Lecture Topics	Lab Activities
1	Sept 2 Sept 3 – 6	LABOUR DAY Course Introduction The Cell – Basic Unit of Life <i>Nursing – Introduction</i>	COLLEGE CLOSED LAB 1: Lab Safety Anatomical Terminology Systems Overview
2	Sept 9 – 13	Tissues Integumentary System	LAB 2: The Cell – Structure and Function Tissues Integumentary System
3	Sept 16 – 20	Skeletal System <i>Nursing – Skin integrity</i>	LAB 3: Skeletal System
4	Sept 23 Sept 24 – 27	EXAM #1 Skeletal and Muscular Systems	LAB 4: Skeletomuscular System
5	Sept 30-Oct 4	Muscular System <i>Nursing – Movement and exercise</i>	LAB 5: Muscles Articulations and Movement
6	Oct 7 – 11	Nervous System	LAB EXAM #1
7	Oct 14 Oct 15 – 18	THANKSGIVING DAY Nervous System <i>Nursing – Cognition and perception</i>	COLLEGE CLOSED LAB 6: Neural tissue Central Nervous System
8	Oct 21 – 25	Nervous System	LAB 7: Peripheral Nervous System Cranial and Spinal Nerves Reflexes Anatomy of the Eye and Ear
9	Oct 28-Nov 1	Endocrine System <i>Nursing – Sleep</i>	LAB 8: Sensory Reception
10	Nov 4 Nov 5 – 8	EXAM #2 Endocrine System	LAB 9: Endocrine System
11	Nov 11 Nov 12 – 15	REMEMBRANCE DAY Endocrine System	COLLEGE CLOSED LAB 10: Cardiovascular Anatomy
12	Nov 18 – 22	Cardiovascular System <i>Nursing – Cardiovascular 1</i>	LAB 11: Cardiovascular – Blood
13	Nov 25 – 29	Cardiovascular System	LAB EXAM #2
14	Dec 2 – 6	Cardiovascular System	LAB 12: Cardiovascular Physiology
15	Dec 9- 17	FINAL COMPREHENSIVE EXAM (Date TBA)	

LEARNING OUTCOMES

Upon successful completion of Biology 152 and Biology 153, you will be able to:

- use your knowledge of normal anatomy and physiology to differentiate normal from abnormal when you are doing physical assessments of clients.
- use and understand correct terminology when you are communicating with other members of the health care team.
- use your knowledge of anatomy and physiology as a basis for further study of pathophysiology.
- demonstrate the ability to apply knowledge of anatomy and physiology gained through laboratory activities to the clinical setting.
- help clients by explaining basic anatomy and physiology, nutrition and pharmacology in the maintenance of health and prevention of disease.

Biology 152 is divided into units. The objectives listed include some objectives which have already been covered in the prerequisite courses, (Biology 12 or 080 and Chemistry 11). These objectives will not be covered in classes and will be noted for you to review. It is important that you are familiar with this information in order to understand the other concepts. Students are expected to review these objectives and material covered in these objectives is testable.

COURSE OBJECTIVES

UNIT I

A. INTRODUCTION

1. **Review** the basic functions of living organism.
2. **Review** the major levels of organization in living organisms.
3. **Review** the organ systems of the body, giving their major components and general functions.
4. Define anatomy and physiology and discuss the relationship of structure to function.
5. Explain the concept of homeostasis and its significance for living organisms.
6. Explain the concepts of positive and negative feedback involved in the maintenance of homeostasis and give examples.
7. Locate and identify the closed body cavities and their subdivisions and identify the major organs within the cavities.
8. Demonstrate the ability to correctly use standard anatomical terms and describe
 - anatomical position
 - surface terminology including quadrants and regions
 - directional terminology
 - sectional terminology including planes and cavities
9. Identify the internal organs associated with the quadrants and regions.

B. THE CELL AND CELLULAR PHYSIOLOGY

1. **Review** the cell and distinguish between prokaryotic and eukaryotic cells.
2. **Review** the basic concepts of cell theory.
3. **Review** the organelles of the typical animal cell and their functions.
4. **Review** the structure and overall functions of the cell's membrane.
 - 4.1. Describe the structure of the plasma membrane.
 - 4.2. Explain the relationship of the fluid mosaic model to the functions.
5. Describe the processes by which the cell membranes function.
 - 5.1. **Review** major functions of cell membranes.
 - 5.2. **Review** effects of molecular size, charge, and solubility on permeability of the cell membrane.
 - 5.3. Describe the processes of membrane transport.
 - 5.4. Explain endocytosis: phagocytosis and pinocytosis.
 - 5.5. Explain exocytosis.
 - 5.6. Describe and distinguish between isotonic, hypotonic and hypertonic solutions.
6. **Review** the process of cellular respiration as a means of harvesting energy.
7. **Review** the concept of cellular metabolism.
 - 7.1. Define the terms anabolism and catabolism and apply them to cellular activities.
 - 7.2. Describe the role of ATP in a cell.
 - 7.3. Explain the role of oxygen in the production of energy: anaerobic respiration and aerobic respiration.
 - 7.4. Identify forms of energy.
 - 7.5. Distinguish between exergonic and endergonic reactions.
8. **Review** the role of enzymes in biochemical reactions.
 - 8.1. Describe the significance of "activation energy."
 - 8.2. Describe the mode of action of enzymes.
 - 8.3. Discuss factors affecting enzyme action.
9. **Review** the genetic structure of the cell and the means by which it controls its daily activities through the process of protein synthesis.
10. Explain the actions of hormones at the cellular level and distinguish between the three classes of hormones.

C. TISSUES

1. Describe the structure and give the functions and typical locations of the four principal types of tissue found in the human body.

1.1. Describe the relationship between form and function for each type of epithelial tissue.

Simple

- squamous
- cuboidal
- columnar

Stratified

- squamous
- cuboidal
- columnar
- transitional
- pseudostratified

1.2 Describe the role of epithelium in glandular secretion.

1.3 Compare the structure and function of various types of connective tissue.

Connective tissue proper

- areolar or loose
- adipose
- reticular
- dense regular
- dense irregular

Bone (covered in Unit II)

Cartilage

- hyaline
- fibrocartilage
- elastic

Blood (covered in Unit V)

1.4 Muscle tissue (covered in Unit II)

1.5 Nervous tissue (covered in Unit III)

2 Explain how connective tissues and epithelial tissues combine to form different types of membranes.

D. THE INTEGUMENTARY SYSTEM

1. Describe the structure and function of the integumentary system and its derivatives.
2. Identify and describe the principal components of the integumentary system.
 - 2.1. Name the two principal layers of the skin.
 - 2.2. Describe the structure and function of the epidermis, the process of keratinization and pigmentation.
 - 2.3. Describe the structure and function of the dermis including the main regions and their inclusions.
 - 2.4. Describe the structure and function of the hypodermis.
3. Describe the functions of hair and nails.
4. Describe the structure, location and function of glands of the integumentary system.

UNIT II

A. BONE AND THE SKELETAL SYSTEM

1. Describe the overall functions of the skeletal system.
2. Describe the classification of bones by shape.
3. Identify major types of bone markings and explain their significance.
4. Describe the microstructure of bone.
 - 4.1. Describe the roles of osteoblasts, osteocytes and osteocytes.
 - 4.2. Describe the role of mineral salts and collagen fibers.
5. Identify and describe the anatomy of a typical long bone.
 - epiphysis, epiphyseal plate and epiphyseal line, diaphysis, periosteum, endosteum, medullary cavity, articular cartilage
6. Identify and describe the anatomy of a typical flat bone.
7. Distinguish between cancellous (spongy) and compact (Haversian) bone.
8. Describe the development and growth of bone.
 - 8.1. Distinguish between ossification and calcification.
 - 8.2. Describe intramembranous ossification.
 - 8.3. Describe endochondral ossification.
9. Name the two major divisions of the skeleton.
10. Identify the major bones of the axial skeleton and the appendicular skeleton.

AXIAL SKELETON

The skull – Bones and Landmarks

Cranium

- parietals (2)
- temporals (2)
 - external auditory meatus, mastoid process
- frontal
 - sinus
- occipital
 - foramen magnum, occipital condyles
- sphenoid
 - sella turcica
- ethmoid
 - cribriform plate, conchae

Facial

- maxilla
- lacrimals
- mandible

Ossicles

- malleus
- incus
- stapes

Hyoid

The Vertebral Column, Ribs and Sternum

Vertebrae

- cervicals
- thoracics
- lumbar
- sacrum
- coccyx

Ribs

- true and false, including floating

Sternum

- manubrium, body, xiphoid process

THE APPENDICULAR SKELETON

Upper Limb

Pectoral girdle

- scapula
- clavicle

Arm

- humerus -head, greater and lesser tubercles, deltoid tuberosity
- radius - head, neck, radial tuberosity
- ulna -olecranon process
- carpals, metacarpals, phalanges

Lower Limb

Pelvic girdle

- coxa or pelvic bone
pubis, ischium, ilium, acetabulum, obturator foramen, iliac crest, anterior superior iliac spine, ischial spine, pubic symphysis

Leg

- femur
head, neck, greater and lesser trochanters, medial and lateral condyles
- tibia
head, medial and lateral condyles, tibial tuberosity, medial malleolus
- fibula
head, lateral malleolus
- patella
- tarsals
- metatarsals
- phalanges

B. ARTICULATIONS

1. Define articulation.
 - 1.1 Classify articulations functionally.
 - 1.2 Classify articulations structurally.
 - 1.3 Name and give examples of fibrous, cartilaginous and synovial joints in terms of structure and function.
2. Describe the parts of a synovial joint.
3. Describe the structure, function and general locations of bursae and tendon sheaths.
4. Briefly describe the following structural features of the following joints:

Shoulder

- bones involved: humerus, scapula, clavicle
- articulating surfaces

Elbow

- bones involved: radius, ulna, humerus
- articulating surfaces

Hip

- bones involved: pelvis, femur
- articulating surfaces

Knee

- bones involved: femur, tibia, fibula, patella
- articulating surfaces
- cartilages: medial and lateral menisci
- ligaments: patellar, medial and lateral collateral, cruciate

5. Describe the relationship between joint structure and mobility.

C. THE MUSCULAR SYSTEM

1. Identify and compare the characteristics and overall functions of the three types of muscle tissue.
2. Describe the structure of a whole skeletal muscle.
 - epimysium, perimysium, endomysium, fascicle, fascia, sarcolemma, nerves and blood vessels
3. Describe the microstructure of a skeletal muscle fibre (cell).
 - sarcolemma, sarcoplasm, sarcoplasmic reticulum, terminal cisternae, transverse tubules, triad, myofibrils, myofilaments: thin (actin), thick (myosin), sarcomere
4. Describe the transmission of a neural action potential to a muscle cell at the neuromuscular junction.
 - 4.1. Describe the structure of a neuromuscular junction.
 - presynaptic terminal, synaptic vesicles, synaptic cleft, postsynaptic terminal, receptors
 - 4.2. Describe the synaptic process in terms of the function of calcium, acetylcholine, acetyl cholinesterase, sodium channels.
5. Describe the key steps involved in the contraction of a skeletal muscle fibre.
6. Describe the physiology associated with whole muscle contraction in terms of stimuli, contraction types, fatigue, oxygen debt, exercise and heat production.
7. Identify selected muscles and muscle groups and describe their actions.

Head muscles

masseter
temporalis
sternocleidomastoid
trapezius
extraocular eye muscles

Thoracic muscles

intercostals
diaphragm

Abdominal muscles

rectus abdominis
internal and external oblique

Perineal muscles

sphincter ani externus
sphincter urethrae
levator ani
bulbospongiosus

Upper limb muscles

trapezius
deltoid
rhomboids
latissimus dorsi
pectoralis minor and major
biceps and triceps brachii

Lower limb muscles

gluteus maximus and medius
adductor group
quadriceps femoris
tensor fasciae latae
sartoris
hamstrings
gastrocnemius
soleus
tibialis anterior

UNIT III

THE NERVOUS SYSTEM

A. NEURAL TISSUE

1. **Review** the structure of nervous tissue.
 - 1.1 Describe the structure and function of neural support tissue.
 - Neuroglial cells in the CNS
 - Neuroglial cells in the PNS
 - 1.2 Describe the structure and function of the “typical” afferent and efferent neuron.
 - 1.3 Classify neurons according to structure and function.
2. Explain neural transmission (neurophysiology).
 - 2.1 Explain how the resting potential is created and maintained.
 - 2.2 Describe the events involved in the generation and propagation of an action potential.
 - 2.3 Discuss the factors that affect the speed with which action potentials are propagated.
 - 2.4 Describe the structure of a synapse and explain the mechanism involved in synaptic transmission.
 - 2.5 Describe the major kinds of neurotransmitters and neuromodulators and discuss their effects on postsynaptic membranes.

B. THE NERVOUS SYSTEM

1. **Review** the major divisions of the nervous system and the overall functions.
 - 1.1 Describe the structural divisions: Central Nervous System (CNS) and Peripheral Nervous System (PNS).
 - 1.2 Describe the functional divisions.
 - Afferent and efferent
 - Somatic and autonomic
 - 1.3 Distinguish between the sympathetic and parasympathetic divisions of the Autonomic Nervous System (ANS).

2. Identify the components of the **CENTRAL NERVOUS SYSTEM**
 - 2.1 Locate and describe the major components of the brain and their overall functions.
 - Cerebrum (major lobes, location of white and gray matter)
 - Diencephalon (thalamus, hypothalamus, epithalamus, hypophysis)
 - Midbrain
 - Hindbrain (pons, medulla oblongata, cerebellum)
 - Ventricles
 - Brain stem (midbrain, pons, medulla oblongata)
 - 2.2 Describe the structure of the spinal cord and its overall functions.
 - 2.3 Describe the location and extent of the spinal cord.
 - 2.4 Describe the spinal cord in cross-section.
 - Identify the gray horns and white columns.
 - Describe the anterior (ventral) and posterior (dorsal) roots of spinal nerves and the dorsal root ganglia.
 - Describe the route of major ascending and descending columns.
3. Describe the structures which protect the Central Nervous System and explain their role in the protection of the CNS.
 - Meninges
 - Cerebrospinal fluid (production, flow and reabsorption)
 - Blood-brain barrier
4. Identify the structures and functions of the **PERIPHERAL NERVOUS SYSTEM**.
 - 4.1 Describe the structure of a typical nerve.
 - 4.2 Be familiar with the total numbers of cranial and spinal nerves.
 - 4.3 Identify the cranial nerves and the function, origin or target of specific cranial nerves.

CRANIAL NERVES

- I Olfactory
- II Optic
- III Oculomotor
- IV Trochlear
- V Trigeminal
- VI Abducens
- VII Facial
- VIII Vestibulocochlear
- IX Glossopharyngeal
- X Vagus
- XI Accessory
- XII Hypoglossal

- 4.4 Identify the spinal nerves and describe the functions, origins and innervations of specific spinal nerves.
- SPINAL NERVES**
- **Cervical Plexus**
 - Phrenic nerve
 - **Brachial plexus**
 - Axillary
 - Radial
 - Musculocutaneous
 - Median
 - Ulnar
 - **Thoracic region**
 - **Lumbar plexus**
 - Obturator
 - Femoral
 - Saphenous
 - **Sacral plexus**
 - Tibial (part of Sciatic)
 - Peroneal (part of Sciatic)
5. Explain reflexes.
- 5.1 Describe the process of neural reflex.
- 5.2 Classify the types of reflexes and explain the functions of each.
- 5.3 Distinguish between the types of motor responses produced by various spinal reflexes.
- 5.4 Discuss important cranial reflexes.
6. Identify the structures and functions of the **AUTONOMIC NERVOUS SYSTEM**.
- 6.1 **Review** the comparison of the autonomic nervous system with other divisions of the nervous system.
- 6.2 Contrast the structures and functions of the sympathetic and parasympathetic divisions of the Autonomic Nervous System (ANS).
- 6.3 **Review** the mechanisms of neurotransmitter release in the ANS.
- 6.4 Discuss the relationship between the two divisions and the significance of dual innervation.
7. Discuss specific hormones of the endocrine system associated with the nervous system and their significance.

C. SENSORY FUNCTION

1. Distinguish between general and special senses.
2. Describe the general sensory receptors.
 - Nociceptors
 - Thermoreceptors
 - Mechanoreceptors
 - Chemoreceptors
3. Explain the functions of the receptors for the general senses.
4. Identify the structures and explain the functions of the special sense of vision.
 - 4.1 Identify the external and accessory structures of the eye and explain their functions.
 - 4.2 Describe the internal structures of the eye and explain their functions.
 - 4.3 Explain how we are able to distinguish colors and perceive depth.
 - 4.4 Explain how light stimulates production of nerve impulses and trace the visual pathways to their destinations in the brain.
5. Identify the structures and explain the functions of the special sense of hearing and equilibrium.
 - 5.1 Describe the structures of the outer and middle ear and explain how they function.
 - 5.2 Describe the parts of the inner ear and their roles in the processes of equilibrium and hearing.
 - 5.3 Trace the pathways for the sensations of equilibrium and hearing to their respective destinations in the brain.

UNIT IV

THE ENDOCRINE SYSTEM

1. **Review** the general characteristics of the endocrine system and explain the process of homeostasis.
 - 1.1 Distinguish between negative and positive feedback.
 - 1.2 Describe the general functions of endocrine glands.
2. **Review** the major chemical classes of hormones and the general mechanisms of hormone action.
3. Describe the functional organization of the endocrine system in terms of the interaction of hormones with their target tissues.
 - 3.1 Describe the length of time it takes to eliminate a substance from the circulatory system in terms of its half-life.
 - 3.2 Describe the interaction of hormones with their target tissues in terms of hormone receptors.
 - Describe the response of some target cells to hormone stimulation in terms of “down” or “up” regulation.
 - Classify hormone receptors as either membrane-bound or intracellular.
 - Describe the membrane-bound receptor second messenger model of hormone function with examples.
 - Describe the intracellular receptor mechanism with examples.
4. Describe the location, hormones and functions of the following endocrine glands and tissues.
 - 4.1 The pituitary gland
 - Describe the hypothalamus-pituitary axis.
 - Describe the structure of the anterior pituitary (adenohypophysis) and the posterior pituitary (neurohypophysis) and their relationship with the circulatory system.
 - Identify the hormones of the posterior pituitary and their functions.
 - Identify the major hormones of the anterior pituitary and their functions.
 - 4.2 The adrenal glands
 - Describe the structure of the two major regions of the adrenal glands.
 - Identify the hormones of the adrenal medulla and their functions.
 - Identify the hormones of the adrenal cortex and their functions.
 - 4.3 The thyroid gland
 - 4.4 The parathyroid gland
 - 4.5 The pancreas
 - Describe the structure of the islets of Langerhans.
5. Compare the functional roles of the endocrine and the nervous systems.

UNIT V

THE CARDIOVASCULAR SYSTEM

A. ANATOMY OF HEART AND VESSELS

1. Describe the components of the circulatory system.
2. Identify the major circulatory subsystems.
 - Pulmonary
 - Systemic (including Coronary and Hepatic Portal systems.)
3. **Review** the location of the heart, its external and internal anatomy and blood supply.
 - 3.1 Describe the orientation of the heart in the mediastinum.
 - 3.2 Describe the visceral and parietal pericardia and their significance.
 - 3.3 Describe the structure of heart in terms of epicardium, myocardium and pericardium.
 - 3.4 Identify the chambers and heart valves and their functions.
 - 3.5 Trace the flow of blood through the heart, identifying the major blood vessels, chambers and valves.
 - 3.6 Describe the vascular supply and innervation of the heart.
4. **Review** the types of blood vessels in terms of their structure and function.
5. Identify the major blood vessels and the areas they serve.

B. BLOOD

1. Describe the components and major functions of blood.
2. Discuss the composition and functions of plasma.
3. Differentiate between serum and plasma.
4. Describe the origin, production and characteristics of the formed elements of blood.
 - 4.1 Describe the characteristics and functions of erythrocytes.
 - 4.2 Describe the structure of hemoglobin and its functions.
 - 4.3 Explain the production, degradation and recycling of erythrocytes.
 - 4.4 Categorize the normal leukocytes on the basis of their characteristic structures and functions.

- 4.5 Describe the production, structure and function of platelets.
5. Explain the processes associated with hemostasis.
 - 5.1 Describe the three phases of hemostasis: Vascular, Platelet and Coagulation.
 - 5.2 Discuss the regulation of the three phases.
 - 5.3 Identify specific clotting factors and the significance of calcium ions and vitamin K to blood coagulation.
6. List examples of important blood tests and explain their clinical significance.
7. Explain the importance of blood typing on the basis of ABO and Rh incompatibilities.

N.B. Cardiovascular physiology will span first and second semester. The topics covered in semester 1 may not include all of the following. Prior to the beginning of semester 2, review of topics from semester 1 will be necessary in preparation for the laboratory in the first week of class.

C. CARDIOVASCULAR PHYSIOLOGY

1. Explain cardiodynamics.
 - 1.1 Define stroke volume and cardiac output and discuss the influencing factors.
 - 1.2 Explain effects of adjustments in stroke volume and cardiac output.
 - 1.3 Discuss factors that affect heart function.
2. Discuss the physiology of blood pressure, blood flow and capillary exchange.
 - 2.1 Explain the mechanisms that regulate blood flow through the vessels
 - 2.2 Describe the factors that influence and regulate blood pressure.
 - 2.3 **Review** the mechanisms associated with the movement of fluids between capillaries and interstitial spaces.
3. Describe the cardiac cycle.
 - 3.1 Describe the events of an action potential in cardiac muscle and the importance of calcium ions.
 - 3.2 Discuss the function of nodal and conducting cells.
 - 3.3 Describe the components and functions of the conducting system of the heart.
 - 3.4 Explain the events of the cardiac cycle and relate the heart sounds to the specific events.
 - 3.5 Explain the significance of the electrocardiogram tracing.
4. Discuss the hormones that influence cardiovascular function.