

SAULT COLLEGE NURSING PROGRAM

BIOLOGY I

198³ - 198⁴

BIOLOGY 101

YEAR 1, SEMESTER

OBJECTIVES

LEARNING RESOURCES

I INTRODUCTORY OVERVIEW

A. Terminology

1. Define the terms used to describe parts of the human body.

Complete "Overview of Systems" Worksheets.

- a) planes
- b) regions
- c) cavities
- d) general terms as listed in the worksheet
- e) specific terms as listed in the worksheet

Read Chapter 1

2. Describe locations & parts of the human body using these terms.

B. Biological Regulators (Overview)

1. The Nervous System

- a) identify the major structures of the nervous system.
- b) list the structures required for effective impulse transmission which results in a desired response.
- c) list the differences between the:
 - i) somatic nervous system
 - ii) visceral nervous system
- d) state the 2 general functions of and locate the major:
 - i) somatic nerves
 - ii) visceral nerves
- e) describe the role of the nervous system in supporting adaptation.

Consult Chapter 9

2. The Endocrine System

- a) identify & locate the major endocrine glands.
- b) state the general function of an endocrine gland.

Consult Chapter 6

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- c) state the general function of hormones.
- d) describe the role of the endocrine system in supporting adaptation.
- e) relationship of the Nervous System & The Endocrine System.

3. The Integumentary System

- a) state 2 general functions of the skin.
- b) identify & locate the major structures of the skin.
- c) identify & locate the major structures of the mucous membrane.
- d) list & locate the areas of the body where there is mucous membrane.
- e) identify how each structure supports the general functions.
- f) describe the role of the integumentary system in supporting adaptation.

Consult Chapter 5

4. The Special Senses

- a) identify & locate the receptors for each of the special senses.
 - i) eye
 - ii) ear
 - iii) nose
 - iv) tongue
 - v) skin
- b) state the function for each receptor.
- c) describe the role of the special senses in supporting adaptation.

Consult Chapters 10 & 5

C. Support Systems (Overview)

1. Musculoskeletal

- a) state the 3 general functions of the musculoskeletal system.
- b) identify & locate the basic structures of the skeletal system.
- c) identify & locate the basic structures of the muscular system.

Consult Chapters 6, 7 & 8

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- d) on diagrams of muscle/bone units, name the structures indicated & explain how these facilitate movement.
- e) on diagrams of muscle groups, name the structures indicated & explain how these facilitate support.
- f) on diagrams of bone groups, name the structures indicated & explain how these facilitate protection.
- g) describe the role of the musculo-skeletal system in supporting adaptation.

2. Circulatory & Lymphatic Systems

- a) state 2 general functions of the cardiovascular & lymphatic systems of the body.
- b) identify & locate the major arteries. Consult Chapters 11 & 12
- c) identify & locate the major veins.
- d) on a diagram of the lymphatic system, identify the direction of flow of lymph & the major areas of the lymph nodes.
- e) state the function of the heart & vessels of the cardiovascular & lymphatic systems.
- f) describe the role of the circulatory & lymphatic systems in supporting adaptation.

3. The Respiratory System

- a) state the general function of the respiratory system.
- b) identify & locate the major structures of the respiratory system. Consult Chapter 13
- c) identify the location of these structures in the thoracic cavity.

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- d) state the function of these structures in relation to the system as a whole:
 - i) from the nose to the bronchus
 - ii) the lungs
- e) describe the role of the respiratory system in supporting adaptation.

4. The Urinary System

- a) state the 2 general functions of the urinary system.
- b) identify & locate the major structures of the urinary system. Consult Chapter 15,
- c) identify & locate the regions of the abdomen & body cavities in which the major structures are located.
- d) state the function of each of the structures in relation to the function of the urinary system as a whole.
- e) describe the role of the urinary system in supporting adaptation.

5. The Gastrointestinal System

- a) state the 2 general functions of the G.I. system.
- b) identify & locate the major structures of the digestive system. Consult Chapter 14
- c) locate the structures of the G.I. tract according to the regions of the abdomen.
- d) state the function of structures in relation to the function of the G.I. system as a whole:
 - i) from mouth to small intestine
 - ii) from large intestine to anus
 - iii) the accessory organs--liver, pancreas, gall bladder.
- e) describe the role of the G.I. system in supporting adaptation.

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6. The Reproductive System

- a) state the 4 general functions of the female reproductive system.
- b) identify & locate the major structures of the female reproductive system.
- c) locate these structures within the body cavities.
- d) describe the role of the female reproductive system in supporting adaptation.
- e) state the 2 general functions of the male reproductive system.
- f) identify & locate the major structures of the male reproductive system.
- g) locate these structures within the body cavities.
- h) describe the role of the male reproductive system in supporting adaptation.

Consult Chapter 18

II THE SMALLEST UNIT (CELL)

A. Protoplasm

1. Describe the elements & compounds of protoplasm.
2. Describe inorganic & organic constituents of protoplasm.
3. Describe the functions of water, proteins, fats & carbohydrates in protoplasm.

Complete worksheets in "The Smallest Unit"

A. "Protoplasm"

Read Chapter 2, p. 29-40
(Chemical Constituents of Living Matter)

B. The Cell

1. Describe the functions of the component parts of the cell.

Complete the worksheets in B. "The Cell"

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- a) cell membrane
- b) layers and pores
- c) cytoplasm & cytoplasmic organelles
- d) nucleus
- e) nucleolus
- f) chromosomes
- g) genes
- h) D.N.A.
- i) R.N.A.

Identify all cellular structures on the cell model and wall chart.

Read Chapter 3, p. 44-76

- 2. Define selective permeability
- 3. Explain 2 general functions of all cells.
- 4. Explain how the structures contribute to the function of the cell as a whole.
- 5. Cell Division
 - a) describe 2 methods of cell division.
 - b) state an example for each method.
- 6. Embryonic Life
 - a) explain the origin & destiny of the primary germ layers.
 - b) explain the development of the embryonic membrane.

C. Movement Through Membranes

- 1. Define homeostasis, interstitial fluid, intracellular fluid, extra-cellular fluids & internal environment.
- 2. Explain the role of the circulatory system in supporting adaption of the internal environment.

Complete Worksheets on:
C. "Movement Through Membranes"

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3. Define & state 1 example from the human body of the following processes:

- a) diffusion
- b) facilitated diffusion
- c) active transport
- d) ingestion
- e) filtration
- f) osmosis

4. Define semi-permeability

5. Define filtration pressure

6. Define osmotic pressure

D. Organization of Cells

1. Define "Tissue"

2. List the 4 primary tissue types

3. List the functions for each of the primary tissue types

4. Relate the different structures & functions of tissue cells.

5. List 2 examples for each primary tissue type.

6. List 2 examples of location for each of the following sub-types of epithelial tissue:

- a) simple squamous epithelium
- b) simple cuboidal epithelium
- c) ciliated columnar epithelium
- d) stratified squamous epithelium

7. List 2 examples of location for each of the following sub-types of connective tissue:

Complete Worksheets on:
D. "Organization of Cells"
Read Chapter 4, p. 81-91

III MICROBIOLOGY

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LEARNING RESOURCES

- a) adipose
 - b) hemopoietic (blood)
 - c) fibrous (dense; tendons & ligaments)
 - d) loose (areolar)
 - e) cartilage
 - f) bone (osseous)
8. List 1 example of location for each of the following sub-types of muscle tissue:
- a) visceral (smooth, involuntary)
 - b) skeletal (striated, voluntary)
 - c) cardiac
9. Define "organ"
10. Given the stomach as an example of an organ, list the basic tissue types which make up the organ.
11. Explain the contribution of the individual functions of each tissue type to the function of the organ as a whole.
12. Define "system"
13. Given the following systems as an example, name the organs which make up that system & state the functions of the organs.
- a) urinary system
 - b) nervous system
14. Explain the functions of the organs as they contribute to the function of the system as a whole.

Consult Chapter 1

III MICROBIOLOGY

1. Define the selected words associated with microbiology

Complete the worksheet on "Microbiology"

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2. Briefly explain the types of microbial pathogens & parasites.
 - a) bacteria
 - b) algae
 - c) rickettsiae
 - d) viruses
 - e) fungi (yeasts & molds)
 - f) protozoa
 - g) helminths
 - h) arthropods.
 3. List 1 example of a disease or condition caused by the above types of organisms.
 4. Describe the sub-types of bacteria according to shape.
 5. Describe the general characteristics of a bacterial cell.
 6. Describe the general characteristics of viruses.
 7. Describe the growth requirements of most bacteria.
 8. Describe the normal flora of the human body.
 9. Describe transmission & portals of entry & exit of microorganisms.
 10. Explain the criteria important in determining if infection will follow microbial invasion.
 - a) number of organisms
 - b) virulence of organisms
 - c) adaptive responses of host
- Consult a microbiology text from the library.

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11. Explain the adaptive responses of the host.
 - a) general adaptive syndrome
 - b) nonspecific
 - c) specific - antigens & antibodies
- immunity
12. Explain "culture & sensitivity"
13. Explain "drug resistance"
14. Explain common diagnostic tests which confirm presence of pathogens.
15. Describe the methods of assisting man in adapting to microorganisms.
 - a) physical agents
 - i) mechanical
 - ii) heat
 - iii) miscellaneous
 - b) chemical agents
 - i) disinfectants and antiseptics
 - ii) chemotherapeutic agents
16. Discuss the topics concerned with microbes in everyday life.
 - a) air
 - b) water and sewage
 - c) milk
 - d) food
 - e) useful activities
 - f) world health problems

IV BIOLOGICAL REGULATORS

A. Neural Control Mechanisms

1. Define the selected words associated with the nervous system.

Complete Worksheets on "Neural Control Mechanisms"

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2. Describe the structures which compose a neuron.
3. Describe the functions of these parts.
4. Describe the types of functions of neurons.
 - a) afferent
 - b) efferent
 - c) internuncial
5. Describe conduction of an impulse
 - a) along a neuron
 - b) across a synapse
 - c) across a myoneural junction
6. Central Nervous System
 - a) describe structure, location & function of the spinal cord, meninges and brain.
 - b) describe the location of the ventricles & spinal canal.
 - c) discuss the production, circulation and function of cerebrospinal fluid.
7. Peripheral Nervous System
 - a) spinal nerves
 - i) describe the attachment of spinal nerves to the spinal cord.
 - ii) describe the functions of selected spinal nerves & plexuses.
 - iii) describe a reflex arc
 - iv) explain 3 types of spinal reflexes.

Read Chapter 9,
p. 234-319

Review overview section

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b) cranial nerves

- i) describe the location and function of the cranial nerves
- ii) relate the principle of reflexes to the cranial nerves.

c) autonomic nervous system

- i) describe the structure and function of the Sympathetic & Parasympathetic divisions
- ii) describe the expected response of each division of selected effectors.

8. Development of Nervous System

- a) describe the embryonic development
- b) describe the effects of aging
- c) discuss ways to improve life during the aging process

B. Hormonal Control Mechanisms

1. Define the selected words associated with the Endocrine System.
2. Explain the 2 ways generally in which endocrine glands are controlled.
 - a) negative feedback
 - b) nervous control
 - c) blood chemistry
3. Explain the role of the hypothalamus in endocrine secretion
4. Locate & state the function of the following endocrine glands:
 - a) pituitary
 - i) anterior & posterior
 - b) thyroid
 - c) parathyroid

Complete the Worksheets on B. "Hormonal Control Mechanisms"

Read Chapter 15, p. 541-569

Review "Overview" section

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- d) adrenal
 - e) pancreas
 - f) ovaries
 - g) testes
 - h) pineal body
 - i) thymus
 - j) placenta
5. Describe the functions of the hormones secreted by the stated endocrine glands.
6. Explain the negative feedback mechanism for the following glands:
- a) thyroid
 - b) parathyroid
 - c) adrenal
 - d) ovaries
 - e) testes
7. Development of the Endocrine System
- a) describe the embryonic development
 - b) describe the effects of aging
 - c) discuss ways to improve life during the aging process

C. Thermal Control Mechanisms

- 1. Describe the basic structures & functions of the skin & mucous membrane. Complete Worksheets on: C. "Thermal Control Mechanisms" (The Integumentary System)
- 2. Describe the role of the skin in adapting to heat production or temperature drop. Read Chapter 5, p. 98-104
- 3. Explain how the skin & mucous membrane provide mechanical and chemical barriers to stimuli. Review "Overview" section
- 4. Explain the role of the hypothalamus & nervous system in the skin's response to thermal changes.

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5. Describe the adaptive mechanisms of inflammation, phagocytosis & wound healing.
6. Development of the Integumentary System.
 - a) describe the embryonic development
 - b) describe the effects of aging
 - c) discuss ways to improve life during the aging process.

D. Sensory Control Mechanisms

1. The Eye

- a) relate the structural characteristics to the function of the:
 - i) bony orbit
 - ii) eyelids
 - iii) eyebrows & eyelashes
 - iv) lacrimal apparatus
- b) describe the structures and functions of the parts of the eyeball.
- c) describe the location and function of the extrinsic muscles of the eyeball.
- d) describe the formation of a retinal image.
- e) describe the pathway followed by a visual impulse from the receptor to the visual sensory area in the brain.
- f) describe the following reflexes of the eye.
 - i) blinking
 - ii) pupillary

2. The Ear

- a) relate the structures to the functions of all parts of the external, middle and internal ear.

LEARNING RESOURCES

Complete Worksheets on:
D. "Sensory Control Mechanisms"

Read Chapter 10, p. 327-350

Review "Overview" section

Dissect a beef eye

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- b) relate the functions of the parts of the ear to hearing & equilibrium
- c) describe the pathway followed by an auditory impulse from the receptor to the auditory area in the brain.

3. The Nose

- a) describe the structure of the nose in relation to the function of smell.
- b) describe the afferent pathway followed by an olfactory impulse from the receptor to the olfactory centre in the brain.

4. The Tongue

- a) describe the structure of the tongue in relation to the function of taste
- b) describe the afferent pathway followed by a gustatory impulse from the receptor to the gustatory centre in the brain.

5. The Skin

- a) describe the structure of the skin in relation to the function of touch.
- b) describe the afferent pathway followed by an impulse from the receptors to the brain.
 - heat - pressure - touch
 - cold - pain

E. Development of the Special Senses

- 1. Describe the embryonic development.
- 2. Describe the effects of aging
- 3. Discuss ways to improve life during the aging process.

LEARNING RESOURCES

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V. SUPPORT SYSTEMS

A. Musculoskeletal

1. Bones

- a) define the words associated with the skeletal system
- b) explain the functions of the skeletal system
- c) describe the macroscopic structures of a long bone
- d) list the 2 divisions of the skeleton & the bones of each division
- e) locate & identify the bones of the human body
- f) describe the fontanels
- g) describe the structure & functions of sinuses
- h) discuss normal spinal curvatures
- i) describe the structures and functions of parts of a vertebrae
- j) describe endochondral and intramembranous ossification
- k) explain the growth of bones
- l) explain the Haversian System
- m) describe the 2 types of bone marrow
- n) explain how bone repairs itself
- o) describe how bones are maintained

Complete the Worksheets:
1. "Bones"

Read Chapter 6, p. 107-146

Review "Overview" section

Become familiar with all the bones of the skeleton

2. Muscles

- a) define the words associated with the muscular system.
- b) define the movements which occur together.
- c) describe the general function and basic principles of muscle action.

Complete the Worksheets:
2. "Muscles"

Read Chapter 8, p. 166-227

Review "Overview" section

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- d) locate & state the specific function of major muscles of the human body.
- e) describe skeletal muscle tissue
 - i) microscopic structures
 - ii) characteristics
 - iii) mechanism of contraction
 - iv) types of contraction
- 3. Articulations
 - a) define the words associated with articulations.
 - b) describe the 3 types of articulations giving examples of each:
 - i) diarthroses
 - ii) synarthroses
 - iii) amphiarthroses
 - c) describe the movements possible at each type of articulation.
- 4. Development of the Musculoskeletal System
 - a) describe the embryonic development
 - b) describe the effects of aging
 - c) discuss ways to improve life during the aging process

LEARNING RESOURCES

Complete the Worksheets;
3. "Articulations"

Read Chapter 7, p. 150-162

END OF SEMESTER 1

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OBJECTIVES

LEARNING RESOURCES

- d) locate & state the specific function of major muscles of the human body.
- e) describe skeletal muscle tissue
 - i) microscopic structures
 - ii) characteristics
 - iii) mechanism of contraction
 - iv) types of contraction

3. Articulations

Read Chapter 7, p. 150-162
 Complete the Worksheets;
 3. "Articulations"

- a) define the words associated with articulations.
- b) describe the 3 types of articulations giving examples of each:
 - i) diarthroses
 - ii) synarthroses
 - iii) amphiarthroses
- c) describe the movements possible at each type of articulation.

4. Development of the Musculoskeletal System

- a) describe the embryonic development
- b) describe the effects of aging
- c) discuss ways to improve life during the aging process