

SAULT COLLEGE OF APPLIED ARTS & TECHNOLOGY  
SAULT STE. MARIE, ONTARIO

COURSE OUTLINE

COURSE TITLE: BIOLOGY

CODE NO.: BIO 101 SEMESTER: I

PROGRAM: NURSING

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APPROVED: *[Signature]* *June 24/94*  
Dean Date



BIOLOGY

BIO 101-5

COURSE NAME

CODE NO.

TOTAL CREDIT HOURS: 80

PREREQUISITE(S): none

**I. PHILOSOPHY/GOALS:**

The Biology course deals with the structure and function of the human body.

This course also includes common stimuli which affect the structure and function of our bodies as well as our adaptive responses, which enable us to maintain a relatively constant state.

Understanding the human body and how it reacts to various stimuli will enable the student to relate this knowledge to the practice of nursing.

**II. STUDENT PERFORMANCE OBJECTIVES:**

Upon successful completion of this course, the student will:

1. Describe biological adaptation in relation to the structure and function of the human body for the selected systems.
  - a) Describe the structure of the human body.
  - b) Describe the function of the human body.
  - c) Describe the relationship of function to structure in the human body.
  - d) Describe specified changes that occur in structure and function as the human body ages.
2. Explain the concept of biological adaptation.
  - a) Discuss some common biological stimuli that impinge upon the human body.
  - b) Explain the concept of adaptation using examples from the biological mode.
  - c) Describe some variables that influence biological responses.
  - d) Illustrate some adaptive and/or ineffective biological responses to specified stimuli.
  - e) Describe how an individual maintains and promotes biological adaptation.

III. TOPICS TO BE COVERED:

1. Terminology
2. Overview of Systems
3. Cells and Tissues
4. Microbiology
5. Musculoskeletal System
6. Nervous System
7. Special Senses
8. Skin
9. Endocrine System

IV. LEARNING ACTIVITIES  
(optional)

REQUIRED RESOURCES

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I. INTRODUCTORY OVERVIEW

A. Terminology

1. Define the terms used to describe parts of the human body.  
a) planes  
b) regions  
c) cavities  
d) general terms as listed in the worksheet  
e) specific terms as listed in the worksheet
2. Describe locations & parts of the human body using these terms.

Complete "Overview of Systems" Worksheets

Read Unit One, Chapter 1

Complete Chapter 1 of the A&P Coloring Workbook (Elaine Marieb)

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 Unit Three, Chapters, 11,12 & 13

IV. LEARNING ACTIVITIES  
(optional)

REQUIRED RESOURCES

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2. The Endocrine System

- a) identify & locate the major endocrine glands.
- b) state the general function of an endocrine gland. Consult Unit Three, Ch. 15
- 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. Consult Unit Two, Ch. 5
- 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.

4. The Special Senses

- a) identify & locate the receptors for each of the special senses.
  - i) eye
  - ii) ear
  - iii) nose
  - iv) tongue
  - v) skinConsult Unit Three, Ch. 14
- b) state the function for each receptor.
- c) describe the role of the special senses in supporting adaptation.

IV. LEARNING ACTIVITIES  
(optional)

REQUIRED RESOURCES

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C. Support Systems (Overview)

1. Musculoskeletal

- a) state the 3 general functions of the musculoskeletal system. Consult Unit Two, Chs. 6, 7, 8,
- b) identify & locate the basic structures of the skeletal system. 9 & 10
- c) identify & locate the basic structures of the muscular system.
- 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 musculoskeletal system in supporting adaptation.

2. Circulatory & Lymphatic Systems

- a) state 2 general functions of the cardiovascular and lymphatic systems of the body.
- b) identify & locate the major arteries. Consult Unit Four, Chs. 16, 17, 18 & 19
- 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.

IV. LEARNING ACTIVITIES  
(optional)

REQUIRED RESOURCES

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3. The Respiratory System

- a) state the general function of the respiratory system.
- b) identify & locate the major structures of the respiratory system. Consult Unit Five, Chs. 22 & 23
- c) identify the location of these structures in the thoracic cavity.
- 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 Unit Five, Ch. 27
- 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 Unit Five, Chs. 24 & 25
- c) locate the structures of the G.I. tract according to the regions of the abdomen.

IV. LEARNING ACTIVITIES  
(optional)

REQUIRED RESOURCES

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- 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.

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. Consult Unit Six, Chs. 30 & 31
- 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.

II. THE SMALLEST UNIT (CELL)

A. Protoplasm

- 1. Describe the elements & compounds of protoplasm. Complete worksheets in "The Smallest Unit"
  - 2. Describe inorganic & organic constituents of protoplasm. A. "Protoplasm"
  - 3. Describe the functions of water, proteins, fats & carbohydrates in protoplasm. Read Unit One, Ch. 2
- Complete appropriate sections of Ch. 2 in The A&P Coloring Workbook

IV. LEARNING ACTIVITIES  
(optional)

REQUIRED RESOURCES

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B. THE CELL

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

Complete the worksheets on B. "The Cell"

- 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 Unit One, Ch. 3

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.

Complete the appropriate sections of Ch. 3 in The A&P Coloring Workbook

IV. LEARNING ACTIVITIES  
(optional)

REQUIRED RESOURCES

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C. Movement Through Membranes

1. Define homeostasis, interstitial fluid, intracellular fluid, extra-cellular fluids & internal environment. Complete Worksheets on: C. "Movement Through Membranes"
2. Explain the role of the circulatory system in supporting adaption of the internal environment.
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

Complete Worksheets on: D. "Organization of Cells"  
Read Unit One, Ch. 4

IV. LEARNING ACTIVITIES  
(optional)

REQUIRED RESOURCES

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7. List 2 examples of location for each of the following sub-types of connective tissue:
  - 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. Complete the appropriate sections of Ch. 3 in the A & P Colouring Workbook
  - 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.



IV. LEARNING ACTIVITIES  
(optional)

REQUIRED RESOURCES

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11. Explain the adaptive responses of the host.
    - a) general adaptive syndrome
    - b) nonspecific
    - c) specific - antigens & antibodies  
- immunity
- Read Unit Four,  
Chs. 20 & 21
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. LEARNING ACTIVITIES  
(optional)

REQUIRED RESOURCES

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IV. SUPPORT SYSTEMS

A. Musculoskeletal

1. Bones

- a) define the word 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 Unit Two, Chapters 6 & 7

Review "Overview" section

Become familiar with all the bones of the skeleton

Complete the appropriate sections of Ch. 5 in The A&P Coloring Workbook

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

Complete the Worksheets:  
2. "Muscles"

Read Unit Two, Chapters 9 & 10

Review "Overview" section

Complete the appropriate sections of Ch. 6 in The A&P Coloring Workbook

IV. LEARNING ACTIVITIES  
(optional)

REQUIRED RESOURCES

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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.

Complete the Worksheets:  
3. "Articulations"  
Read Unit Two,  
Chapter 8

Complete the appropriate sections of Ch. 5 in The A&P Coloring Workbook

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

Test # 2

V. BIOLOGICAL REGULATORS

A. Neural Control Mechanisms

- 1. Define the selected words associated with the nervous system.
- 2. Describe the structures which compose a neuron.
- 3. Describe the functions of these parts.
- 4. Describe the types of functions of neurons.

Complete Worksheets on "Neural Control Mechanisms"

Read Unit Three, Chapters 11, 12 & 13

Review overview section

- 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

IV. LEARNING ACTIVITIES  
(optional)

REQUIRED RESOURCES

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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.
- 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.

Complete the appropriate sections of Ch. 7 of The A&P Coloring Workbook

Dissect a sheep brain

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

Test #3

IV. LEARNING ACTIVITIES  
(optional)

REQUIRED RESOURCES

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B. Sensory Control Mechanisms

Complete Worksheets  
on:

1. The Eye

D. "Sensory Control  
Mechanisms"

- 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

Read Unit Three,  
Chapter 14

Review "Overview"  
section

Dissect a beef eye

2. The Ear

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

IV. LEARNING ACTIVITIES  
(optional)

REQUIRED RESOURCES

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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

6. Development of the Special Senses

- a) Describe the embryonic development.
  - b) Describe the effects of aging.
  - c) Discuss ways to improve life during the aging process.
- Complete the appropriate sections of Ch. 8 in The A&P Coloring Workbook

C. Thermal Control Mechanisms

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

IV. LEARNING ACTIVITIES  
(optional)

REQUIRED RESOURCES

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5. Describe the adaptive mechanisms of inflammation, phagocytosis & wound healing. Complete the appropriate sections of Ch. 4 in The A&P Coloring Workbook
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.

Test # 4

D. Hormonal Control Mechanisms

1. Define the selected words associated with Endocrine System. Complete the Worksheets on B. "Hormonal Control Mechanisms"
2. Explain the 2 ways generally in which endocrine glands are controlled. Read Unit Three, Chapter 15
- a) negative feedback Review "Overview" section  
b) nervous control  
c) blood chemistry
3. Explain the role of the hypothalamus in endocrine glands:
- a) pituitary  
i) anterior & posterior  
b) thyroid  
c) parathyroid  
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. Diagram Test

IV. LEARNING ACTIVITIES  
(optional)

REQUIRED RESOURCES

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6. Explain the negative feedback mechanism for the following glands:

- a) thyroid
- b) parathyroid
- c) adrenal
- d) ovaries
- e) testes

Complete the appropriate sections of Ch. 9 in The A&P Coloring Workbook

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

Final Exam

END OF SEMESTER 1

BIOLOGY

BIO 101-5

COURSE NAME

CODE NO.

V. EVALUATION METHODS: (INCLUDES ASSIGNMENTS, ATTENDANCE REQUIREMENTS, ETC.)

METHOD OF ASSESSMENT (GRADING METHOD):

GRADING	A+ 90 - 100%	Please note that a pass in Biology is a "C".
	A 80 - 89%	
	B 70 - 79%	
	C 60 - 69%	

NOTE:

1. Absence from Tests

If you are unable to attend class for a test, you **MUST** contact the Health Sciences Office (759-2554, Ext. of teacher) before the test. If the test is at 0830 hours you must contact the office before 0900 hours. If you fail to phone in, you will receive a mark of zero for that test.

Students who miss scheduled tests during the semester will not be allowed to write on another day. They will be allowed to take up the test with the other students.

If the teacher has been notified of your absence for the test, the test you missed will count for the same percentage as you receive on the final exam

Each student **MUST** write both the diagram test and the final exam.

2. Excellent attendance (80% or better) will be used to improve borderline marks. (eg: 59, 69, 79, 89)

3. <u>TERM WORK:</u>	Unit Tests	200 marks
	Diagram Test	50 marks
		<hr/>
		250 marks
	Final Exam	150 marks
		<hr/>
		400 marks

Final mark =  $\frac{\text{Your mark out of a possible 400}}{4} = \%$

Week of Oct. 3, 1994	Terminology, Overview and the Cell	50
Week of Oct. 31, 1994	Microbiology and Musculoskeletal System	50
Week of Nov. 21, 1994	Nervous System	50
Week of Dec. 5, 1994	Special Senses & Skin	50
Week of Dec. 12, 1994	Diagram Test	50
Week of Dec. 19, 1994	Final Exam	150
Final Exam covers all material from Sem. I.	(Endocrine System will be tested on final exam)	

Keep track of all your own test marks so that you may calculate your own term mark and be constantly aware of your progress.

5. Extra handouts may be given out during class time. If you are absent, make sure you ask someone to pick up the handout for you. Handouts will not be available after class or on other days.
6. Some class hours will be designated as self-study hours. These hours will be determined at the beginning of the school year.
7. Supplemental Examinations

A supplemental examination may be offered in this course at the discretion of the teacher subject to the following criteria:

- a) The student must have attended at least 60% of the biology classes.
- b) The student must have received at least 50% on the diagram test as well as the final examination. The entire semester's course material will be tested.
- c) The student must have written at least two (2) of the four (4) tests and achieved a passing grade of 60% in each.
- d) Multiple choice questions, short answer questions and diagrams to be labelled will be used in the supplemental examination.
- e) The final grade for the semester will be based solely on the supplemental examination but the grade achieved will not be higher than a "C". The term mark will not be averaged in with the supplemental examination mark.

- f) There will only be one supplemental examination allowed for this course.
- g) If you are eligible to write, please inform the teacher as soon as possible if you are choosing to write the supplemental exam or not.

**VI. REQUIRED STUDENT RESOURCES:**

TEXTBOOKS

1. Anatomy and Physiology, Thibodeau, G.A., Patton, K.T., 2nd Edition, Mosby-Year Book, Inc., Toronto, 1993.
2. Biology Workbook Semester 1.
3. The Anatomy & Physiology Coloring Workbook, A Complete Study Guide, Marieb, Elaine N., 4th edition, The Benjamin/Cummings Publishing Co. Inc., Don Mills, Ontario, 1994 (optional but highly recommended)
4. Two pair of disposable rubber gloves. (Campus Shop)

UNITS & HOURS

1. Terminology and Overview	6
2. The Smallest Unit (Cell)	7
3. Microbiology	5 (self-study) + 2
4. Support Systems	11
5. Biological Regulators	
a) Neural Control Mechanisms	13
b) Sensory Control Mechanisms	8
c) Thermal Control Mechanisms	3 (self-study)
d) Hormonal Control Mechanisms	11
6. Tests and Examinations	7.5

Extra Biology help and review approximately 12 hours (optional)

**VII. ADDITIONAL RESOURCE MATERIALS AVAILABLE IN THE COLLEGE LIBRARY BOOK SECTION:** (title, publisher, edition, date, library call number if applicable)

Articles, reference texts, videos and film strips will be shown in class or available to students from the library/audio visual as deemed necessary by the teacher.

**VIII. SPECIAL NOTES:**

Students will be required to complete problems and readings as assigned.

Students with special needs are encouraged to discuss required accommodations confidentially with the teacher. The teacher reserves the right to modify the course as she/he deems necessary to meet the needs of the students.