

MIDDLESEX COUNTY COLLEGE  
EDISON, NEW JERSEY

Course Title: **Human Anatomy and Physiology II** Catalog #: **Bio. 112**

Class Hours: 3 Laboratory Hours: 3 Credit Hours: 4

Department Chair: \_\_\_\_\_ Division Dean: \_\_\_\_\_ Date: 2001-2002

Prerequisite: Human Anatomy and Physiology I (Bio 111)

Required Textbooks for Course:

<u>Author</u>	<u>Title</u>	<u>Publisher</u>	<u>Copyright</u>
Elaine N. Marieb	<b><u>Human Anatomy and Physiology, 5<sup>th</sup> Edition, with Interactive Physiology CD package</u></b>	Addison Welsey Longman, Inc.	2000
Morton and Perry	<b><u>Photographic Atlas for Anatomy and Physiology</u></b>	Wadsworth Publishing Co.	1998
Elaine N. Marieb	<b><u>Human Anatomy and Physiology Laboratory Manual, Fetal Pig Version, 7<sup>th</sup> Edition, with Physio EX CD-Rom version 2.0 with nine laboratory simulations and Histology tutorial</u></b>	Addison Wesley Longman, Inc.	2002

Materials Required:

Dissection Kit  
Goggles (or safety glasses)

Optional Materials:

Elaine N. Marieb	<b>Anatomy and Physiology Study Guide, 5<sup>th</sup> Edition</b>	Prentice Hall Publishing Co.	2000
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## Bio 112 Lab Schedule

Lab#	LAB EXERCISE TOPIC	REFERENCE PAGES
1	Endocrine Glands	267-273 / 629-632
2	Blood Cells and Transfusions	280-294 / 637-641
3	Anatomy of the Heart	295-303 / 643-647
4	Arteries and Veins	309-324 / 653-659
5	Arteries and Veins; Hepatic Portal and Fetal Circulations	309-324 / 653-659
6	Cardiovascular Physiology	304-308 / 649-651
7	Lab Practical #1	
8	Respiratory Dissection	373-380 / 681-685
9	Digestive Dissection	394-407 / 693-698
10	Excretory Dissection	427-433 / 707-710
11	Male Reproductive System	440-443 / 713-718
12	Female Reproductive / Review	444-446 / 713-718
13	Lab Practical #2	

### **Lab Manuals and Materials Required:**

- 1.) Photo Atlas for Anatomy and Physiology: David Morton and James Perry  
Wadsworth Publishing, 1998
- 2.) Dissection Kit labeled "Bio 111-112" in MCC bookstore.
- 3.) Human Anatomy and Physiology: 4<sup>th</sup> edition, Elaine Marieb, 1998  
Benjamin Cummings Science Publishing. **With 7 pack interactive Physiology disks included.**
- 4.) Marieb Laboratory Manual
- 5.) Lab Objective Sheets

**Catalog Description:**

A continuation of BIO 111. A study of the structure and function of the body is continued by examining the endocrine, reproductive, circulatory, lymphatic, digestive, respiratory and excretory systems.

**Course Goals:**

To provide an understanding of the interrelated structure and function of the cells, tissues and organs of the endocrine, cardiovascular, lymph vascular, respiratory, digestive, urinary, and reproductive systems in the human body. This is accomplished by lectures, class discussions, mammalian dissections, computer simulations, physiological lab experiments, the study of human anatomical models, and appropriate library research.

**Course Objectives:**

At the conclusion of the course the student should be able to:

1. Understand basic anatomical and physiological terminology
2. Understand the basic histology of the endocrine, reproductive, circulatory, lymphatic, digestive and excretory systems
3. Understand the correlation between the histology and the anatomy and physiology of each system
4. Understand the principles of anatomy and physiology of the endocrine, reproductive, circulatory, lymphatic, respiratory, digestive and excretory system
5. Understand the interrelationships between the endocrine, reproductive, circulatory, respiratory, lymphatic, digestive and excretory system
6. Understand the basic physiological principles of homeostasis and feedback
7. Demonstrate the following laboratory skills:
  - a. the use of simple scientific equipment
  - b. collect data and analyze the results of physiological experiments, using the Scientific Method
  - c. animal dissection and correlation with human anatomy
8. Be able to research applicable references from the library to be included in formal laboratory reports and course assignments
9. Be able to discuss current medical, ethical and controversial issues, where students are taught to think creatively, and to examine points and counterpoints of such issues
10. Be aware of the contributions of scientists from various cultures and countries which led to the current knowledge in the field of anatomy and physiology

## COURSE OUTLINE

- I. Endocrine System
  - A. Definition of Endocrine vs Exocrine Glands
  - B. Chemistry of Hormones
    - 1. Proteins
    - 2. Amines
    - 3. Steroids
    - 4. Fatty Acids
  - C. Local Hormones: Eicosanoids, Histamine, Leucotrienes
  - D. Mechanisms of Hormone Action
    - 1. First and Second Messengers
    - 2. Gene Activation
  - E. Feedback Control: Positive and Negative
  - F. Glands, Hormones and their Functions
    - 1. Hypothalamus
    - 2. Hypophysis (Pituitary)
      - a. Adenohypophysis
      - b. Neurohypophysis
    - 3. Thyroid
    - 4. Parathyroid
    - 5. Adrenals
      - a. Cortex
      - b. Medulla
    - 6. Pancreas
    - 7. Ovaries
    - 8. Testes
    - 9. Pineal (Epiphysis Cerebri)
    - 10. Thymus
    - 11. Other Endocrine Organs: Heart, Placenta, Kidneys, Digestive Tract
- II. Circulatory System
  - A. Body Fluids
    - 1. Types and Locations
    - 2. Physiology
    - 3. Interrelationships
  - B. Blood (lab)
    - 1. General Characteristics
    - 2. Functions
    - 3. Components
      - a. Formed Elements
        - (1) erythrocytes
        - (2) leukocytes
        - (3) platelets (thrombocytes)
      - b. Plasma
    - 4. Hemopoiesis

5. Hemostasis
  - a. Vascular Spasms
  - b. Platelet Plug Formation
  - c. Coagulation
    - (1) intrinsic pathway
    - (2) extrinsic pathway
  - a. Clot Formation
  - b. Retraction and Fibrinolysis
  - c. Tests (Normal Values)
    - (1) clotting time
    - (2) bleeding time
    - (3) prothrombin time
    - (4) hemoglobin and hematocrit
- C. Blood Typing (lab)
  1. ABO – groups and percentages
  2. Agglutinations – Agglutination Relationships
  3. Rh – Factor
  4. Transfusion Reaction and Erythroblastosis Fetalis
- D. Cardiovascular System: Heart
  1. Location and size
  2. Structure (lab)
    - a. Pericardium, Myocardium, Endocardium
    - b. Walls and Chambers
    - c. Valves
    - d. Blood Supply
    - e. Neural Supply
    - f. Conduction System
    - g. Nerve Supply
  3. Function
    - a. Cardiac Cycle
    - b. Cardiac Output, Cardiac Reserve, Venous Return, Stroke Volume
    - c. Regulation of Heart Rate by Nervous and Endocrine Systems
    - d. Starling's Law, Right Heart Reflex
    - e. Mary's Law
- E. Cardiovascular System: Vessels
  1. Structure
    - a. Arteries, Arterioles
    - b. Venules and Veins
    - c. Capillaries
  2. Circulatory Routes
    - a. Systemic Circulation
    - b. Pulmonary Circulation
    - c. Hepatic Portal Circulation
    - d. Fetal Circulation

3. Physiology of Circulation
  - a. Blood Flow and Pressure
  - b. Factors Affecting Arterial Blood Pressure
  - c. Factors Affecting Venous Return
  - e. Pulse
- III. Lymphatic System
  - A. Structure and Function
    1. Lymphatic Vessels
    2. Lymphoid Organs: Location and Function
      - a. Thymus
      - b. Spleen
      - c. Tonsils
      - d. Peyer's Patches
      - e. Lymph Nodes
  - B. Lymph Circulation and Contents
  - C. Functions of the System:
    1. Lipid Transport
    2. Immune Responses: Humoral and Cellular, Antigen-Antibody Reaction, Lymphocytes
    3. (T Cells, B Cells), Macrophages
    4. Regulation of Fluid Volume
    5. Protein Return
    6. Prevention of Edema
- IV. Respiratory System
  - A. Organs: Structure and Function (lab)
    1. Nose
    2. Pharynx and Divisions
    3. Larynx (Cartilages)
    4. Trachea
    5. Bronchi
    6. Bronchioles
    7. Lungs (Alveoli)
    8. Diaphragm
    9. Intercostals
  - B. Respiratory Dynamics
    1. Pulmonary Ventilation
      - a. Inspiration
      - b. Expiration
      - c. Diaphragmatic Breathing
      - d. Intercostal Breathing
    2. Air Volumes
    3. Exchange of Respiratory Gases
      - a. Boyle's Law
      - b. Charles' Law
      - c. Dalton's Law of Partial Pressures
      - d. Henry's Law
      - e. Bohr Effect
      - f. Haldane Effect

- C. Distinguish Between Internal, External and Cell Respiration
- D. Mechanisms of Transport of Respiratory Gases
  - 1. Oxygen
  - 2. Carbon Dioxide
  - 3. Bohr Effect
  - 4. Haldane Effect
- E. Control of Ventilation
  - 1. Neural
  - 2. Chemical
  - 3. Physical

V. Digestive System

- A. Phases:
  - 1. Chemical Digestion
  - 2. Mechanical Digestion
- B. Alimentary Canal: Organ Structure and Function
  - 1. Mouth
  - 2. Esophagus
  - 3. Stomach
  - 4. Small Intestine: Duodenum, Jejunum, Ileum
  - 5. Large Intestine: Ascending, Transverse, Descending Colon, Rectum, Anal Canal
  - 6. Sphincters: Cardiac, Pyloric, Ileocecal, Anal
  - 7. Peritoneum: Parietal, Visceral, Mesenteries, Omenta
- C. Accessory Organs: Structure and Function
  - 1. Teeth, Tongue, Cheeks, Palate
  - 2. Salivary Gland
  - 3. Pancreas
  - 4. Liver and Gall Bladder
- D. Mechanical Process
  - 1. Mastication
  - 2. Deglutition
  - 3. Peristalsis
  - 4. Segmentation
  - 5. Pendulum Movements
  - 6. Defecation
- E. Chemical Processes
  - 1. Enzymatic Hydrolysis
    - a. Carbohydrates
    - b. Fats
    - c. Proteins
  - 2. Emulsification of Lipids: Role of Bile
- F. Control of Digestion
  - 1. Neural
  - 2. Hormonal
- G. Mechanisms of Absorption: Blood Vessels, Lacteals
- H. Metabolism
  - 1. Metabolism of Carbohydrates, Fats and Proteins
  - 2. Control of Metabolism

- VI. Urinary System
  - A. Kidney Structure (lab)
    - 1. External
    - 2. Internal
  - B. Nephron
    - 1. Structure (lab)
    - 2. Function
    - 3. Blood and Nerve Supply
    - 4. Juxtaglomerular Apparatus
  - C. Renal Physiology
    - 1. Glomerular Filtration
    - 2. Tubular Reabsorption
    - 3. Tubular Secretion
  - D. Urine
    - 1. Volume and Controlling Factor
    - 2. Physical Characteristics
    - 3. Chemical Composition
  - E. Ureters
  - F. Bladder, Urinary: Structure and Function
  - G. Urethra: Structure and Function (Male and Female)
  
- VII. Reproductive System
  - A. Male: Organ Structure and Function
    - 1. Scrotum
    - 2. Testes
      - a. Seminiferous Tubules
      - b. Interstitial Cells of Leydig
    - 3. Ducts
      - a. Epididymus
      - b. Ductus Deferens
      - c. Ejaculatory Duct
      - d. Urethra
    - 4. Accessory Glands
      - a. Prostete
      - b. Seminal Vesicles
      - c. Bulbourethral Glands (Cowper's)
    - 5. Composition of Semen
    - 6. Penis
      - a. Structure
      - b. Physiology
        - (1) erection
        - (2) emission
        - (3) ejaculation
    - 7. Perineum-Definition and Location

- B. Female: Organ Structure and Function
    - 1. Ovaries
    - 2. Uterine Tubes
    - 3. Uterus
    - 4. Vagina
    - 5. Vulva
    - 6. Perineum
    - 7. Ligaments
    - 8. Mammary Glands
    - 9. Placenta
  - C. Endocrine Functions: Menstrual Cycle
    - 1. Controlling Hormones and Releasing Factors
    - 2. Phases
      - a. Ovarian Phases
        - (1) estrogenic (preovulatory)
        - (2) progesteronic (postovulatory)
      - b. Uterine Phases
        - (1) menstrual
        - (2) proliferative
        - (3) secretory
        - (4) premenstrual
- VIII. Development (OPTIONAL, if time permits)
- A. Embryonic Development
    - 1. Fertilization
    - 2. Zygote, 1 Cell, 2 Cell, Morula, Blastocyst Stages
    - 3. Cleavage Division
    - 4. Implantation
  - B. Extraembryonic Membranes: Structure and Function
    - 1. Chorion
    - 2. Amnion
    - 3. Allantois
    - 4. Yolk Sac
  - C. Umbilicus and Placenta: Structure and Function
  - D. Fetal Development

