

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: 2007-2008

Prerequisite: Human Anatomy and Physiology I (Bio 111)

Required Textbooks for Course:

<b><u>Author</u></b>	<b><u>Title</u></b>	<b><u>Publisher</u></b>	<b><u>Copyright</u></b>
Gerard J. Tortora Bryan Derrickson	<b><u>Principles of Anatomy &amp; Physiology 11<sup>th</sup> edition</u></b>	John Wiley and Sons	2005
	<b><u>Learning Guide for Principles of Anatomy and Physiology</u></b>		
	<b><u>Interactions DVD v2.0</u></b>		
	<b><u>Custom B/W Interactions Review Sheets</u></b>		
	<b><u>Laboratory and Photo Atlas for Human Anatomy and Physiology</u></b>		
	<b><u>eGrade Plus</u></b>		
Allen and Harper	<b><u>Laboratory Manual for Anatomy &amp; Physiology plus free Fetal Pig Dissection A Laboratory Guide, 2<sup>nd</sup> edition</u></b>	Wiley & Sons	2005
Jeffrey Hochbaum	<b><u>Human Anatomy &amp; Physiology I &amp; II Laboratory Images on CD-ROM for Student Review with Questions &amp; Answers Workbook. 2<sup>nd</sup> edition.</u></b>	Bandi	2005

## Bio 112 Lab Schedule

Lab#	LAB EXERCISE TOPIC	REFERENCE PAGES
1	Endocrine Glands	421-431; 666, 681-682
2	Blood Cells and Blood Typing	439-452
3	Anatomy of the Heart	459-476
4	Arteries and Veins	511-532
5	Arteries and Veins; Hepatic Portal and Fetal Circulations	511-532
6	Cardiovascular Physiology	481-489 495-503
7	Lab Practical #1	
8	Respiratory Dissection	555-568
9	Digestive Dissection	589-609
10	Excretory Dissection	625-636
11	Male Reproductive System	655-666
12	Female Reproductive / Review	671-684
13	Lab Practical #2	

### **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 (9 hours)
  - 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, Prostaglandins
  - 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 Blood: (1 ½ hours in lecture)
  - 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 (5 hours in lecture)
  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 Atrial Reflex
    - e. Marey's Law
- E. Cardiovascular System: Vessels (2 ½ -3 hours in lecture)
  1. Structure
    - a. Arteries, Arterioles
    - b. Venules and Veins
    - c. Capillaries
  2. Circulatory Routes (all in lab)
    - 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 (1 ½ hours in lecture)
  - 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. Protein Return
    4. Prevention of Edema
- IV. Respiratory System (4 ½ hours in lecture)
  - A. Organs: Structure and Function (all in 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. Forced inspiration and forced expiration
      - d. Diaphragmatic Breathing
      - e. 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
  - 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 (4 ½ hours in lecture)
  - 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. Defecation
  - E. Chemical Digestion and Absorption
    - 1. Enzymatic Hydrolysis
      - a. Carbohydrates
      - b. Fats
      - c. Proteins
      - d. Nucleic acids
    - 2. Emulsification of Lipids: Role of Bile
  - F. Control of Digestion
    - 1. Neural
    - 2. Hormonal
  - G. Mechanisms of Absorption: Blood Vessels, Lacteals
  
- VI. Urinary System (4 ½ hours in lecture)
  - 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 and its Regulation

- 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 (lab)
- G. Urethra: Structure and Function (Male and Female) (lab)

## VII. Reproductive System

- A. Male: Organ Structure and Function (Lab)
  - 1. Scrotum
  - 2. Testes
    - a. Seminiferous Tubules
    - b. Interstitial Cells of Leydig + Sustentacular cells of Sertoli
  - 3. Ducts
    - a. Epididymis
    - b. Ductus Deferens
    - c. Ejaculatory Duct
    - d. Urethra
  - 4. Accessory Glands
    - a. Prostate
    - b. Seminal Vesicles
    - c. Bulbourethral Glands (Cowper's)
  - 5. Composition of Semen
  - 6. Penis
    - a. Structure
    - b. Physiology
      - (1) erection
      - (2) emission
      - (3) ejaculation
  - 6. Perineum-Definition and Location
- B. Female: Organ Structure and Function (Lab)
  - 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) pregesteronic (postovulatory)
- b. Uterine Phases
  - (1) menstrual
  - (2) proliferative
  - (3) secretory
  - (4) premenstrual

VIII. Fluid and Electrolyte Balance (1 ½ hours if time permits)

- A. Water
- B. Electrolytes and Non-electrolytes
- C. Regulation of Intake and Output
- D. Electrolyte Balance
- E. Acid-Base Balance
- F. Acidosis and alkalosis (Respiratory and Metabolic)