Montgomery County Community College
BIO 130
Introductory Anatomy and Physiology
4-3-3

COURSE DESCRIPTION:
This course is a one semester laboratory course, in which the structure and function of the eleven basic human systems is studied with more emphasis placed on the circulatory, endocrine, urinary, and respiratory systems. Oriented toward students in the MLT program. Dissection of preserved animal material is required. This course is subject to a course fee. Refer to http://mc3.edu/adm-fin-aid/paying/tuition/course-fees for current rates.

REQUISITES:
Previous Course Requirements
None

Concurrent Course Requirements
None

LEARNING OUTCOMES Upon successful completion of this course, the student will be able to:	LEARNING ACTIVITIES	EVALUATION METHODS
1. Define basic terms regarding orientation, direction, and body regions.	Lecture Laboratory Reading Assignments Quizzes Tests Brief Research Paper	Comprehensive Final Exam
2. Name the major types of organic macromolecules in the body, stating their chemical structure and functions.	Lecture Laboratory Reading Assignments Quizzes Tests Brief Research Paper	Comprehensive Final Exam
3. Briefly describe cell structure and membrane transport.	Lecture Laboratory Reading Assignments Quizzes Tests Brief Research Paper	Comprehensive Final Exam

LEARNING OUTCOMES	LEARNING ACTIVITIES	EVALUATION METHODS
4. State the main types of tissues, giving characteristics, examples, and locations of each.	Lecture Laboratory Reading Assignments Quizzes Tests Brief Research Paper	Comprehensive Final Exam
5. Identify anatomic components of all eleven body systems and discuss the normal functioning of each, relating structure to function.	Lecture Laboratory Activities including use of microscope, identification of bones and vessel, dissection of mammalian specimens Reading Assignments Quizzes Tests Brief Research Paper	Comprehensive Final Exam
6. State examples that illustrate the interrelationships among body systems.	Lecture Laboratory Activities including use of microscope, identification of bones and vessel, dissection of mammalian specimens Reading Assignments Quizzes Tests Brief Research Paper	Comprehensive Final Exam
7. Describe selected pathologies in terms of causes and/or treatment.	Lecture Laboratory Activities including use of microscope, identification of bones and vessel, dissection of mammalian specimens Reading Assignments Quizzes Tests Brief Research Paper	Comprehensive Final Exam

LEARNING OUTCOMES	LEARNING ACTIVITIES	EVALUATION METHODS
8. Identify various structures seen in the laboratory.	Lecture Laboratory Activities including use of microscope, identification of bones and vessel, dissection of mammalian specimens Reading Assignments Quizzes Tests Brief Research Paper	Comprehensive Final Exam
9. Demonstrate use of appropriate dissecting, microscopy and laboratory safety skills during laboratory sessions.	Lecture Laboratory Activities including use of microscope, identification of bones and vessel, dissection of mammalian specimens Reading Assignments Quizzes Tests Brief Research Paper	Comprehensive Final Exam

At the conclusion of each semester/session, assessment of the learning outcomes will be completed by course faculty using the listed evaluation method(s). Aggregated results will be submitted to the Associate Vice President of Academic Affairs. The benchmark for each learning outcome is that *70% of students will meet or exceed outcome criteria*.

SEQUENCE OF TOPICS:

I. Introduction
   - A. Terms Of Orientation, Direction, And Body Region
   - B. Body Cavities And Associated Membranes
   - C. Levels Of Body Organization
   - D. Definition Of Homeostasis, Negative And Positive Feedback

II. Overview Of Chemistry
   - A. Atomic Structure
   - B. pH
   - C. Water – Characteristics And Significance
   - D. Organic Macromolecules – Characteristics, Examples, And Structure
     1. Carbohydrates
     2. Lipids
     3. Proteins
     4. Nucleic acids

III. Cells And Tissues
   - A. Structure And Function Of Cell Membrane And Organelles

- B. Transport Across A Membrane
- C. Overview Of Cell Division – Characteristics Of Mitosis And Meiosis
- D. Histology – Epithelial, Connective, Nerve, And Muscle Tissue
  1. Locations
  2. Characteristics
  3. Identification of tissues under the microscope

IV. Integumentary System
- A. Functions
- B. Structure Of Skin And Accessory Organs
- C. Skin Color
- D. Thermoregulation

V. Skeletal System
- A. Functions
- B. Structure Of A Long Bone
- C. Bone Tissue – Compact And Spongy
- D. Ossification And Growth
- E. Identification Of Major Bones In Laboratory Using Real And Plastic Bones
- F. Overview Of Articulations – Structural And Functional Types

VI. Muscle System
- A. Functions
- B. Events Of Contraction And Relaxation
- C. Energy Sources And Oxygen Use
- D. Identification Of Major Superficial Muscles

VII. Nervous System
- A. Functions
- B. Neuron Structure
- C. Membrane Potentials
  1. Resting
  2. Action
- D. Brain – Structure And Functions
- E. Spinal Cord – Structure And Functions
- F. Reflex – Defined
- G. Meninges And Circulation Of CSF
- H. Synapses
  1. Defined
  2. Neurotransmitter release and binding
- I. Autonomic Nervous System
  1. Functions
  2. Branches – sympathetic and parasympathetic
     a. effects of stimulation
     b. neurotransmitters
     c. receptors

VIII. Endocrine System
- A. Hormones
  1. Chemistry
  2. Mechanism of action

3. Hormone-target cell specificity
4. Methods of regulation of secretion

B. Hypothalamus And Infundibulum
1. Control over anterior pituitary
2. Control over posterior pituitary

C. Major Endocrine Glands – Hormones Secreted, Effects, Control Of Secretion, And Disorders
1. Anterior pituitary – GH, PRL, TSH, ACTH, FSH, LH
2. Posterior pituitary – ADH, OT
3. Thyroid – T4 and T3; CT
4. Parathyroids – PTH
5. Adrenal medulla Ep, NE
6. Adrenal cortex – cortisol, aldosterone
7. Pancreas – insulin, glucagon

D. Prostaglandins – Synthesis, Effects

IX. Cardiovascular System

A. Blood
1. General characteristics
2. Plasma
3. Cell types – overview
   a. RBC – characteristics, functions
   b. WBC – characteristics, functions
   c. platelets – characteristics, functions

B. Heart
1. Structure – chambers, valves, septum
2. Path of blood flow through heart
3. Cardiac conduction system
4. Cardiac cycle
5. Role of ANS in regulation of rate
6. Cardiac output
7. Dissection of a mammalian heart

C. Blood Vessels
1. Arteries – structure, function, characteristics
2. Capillaries – structure, function, fluid movement across wall
3. Veins – structure, function, characteristics
4. Names of major vessels and identification on vascular models in the laboratory

D. Blood Pressure
1. Definition
2. Factors influencing
   a. cardiac output
   b. peripheral resistance
   c. blood volume
   d. viscosity

E. Special Circulations
1. Coronary

2. Systemic
3. Pulmonary
4. Hepatic portal

X. Lymphatic And Immune Systems
- A. Lymphatic
  1. Functions
  2. Vessels
  3. Organs – nodes, thymus, spleen, tonsils
  4. Lymphedema
- B. Immune System
  1. Functions
  2. Overview of cell-mediated: role of T-cells
  3. Overview of antibody-mediated: role of B-cells
  4. Types of immunity, defined
     a. active – natural and artificial
     b. passive – natural and artificial

XI. Digestive System And Metabolism
- A. Function
- B. Organs – Structure And Functions
  1. Alimentary canal
  2. Accessory organs
- C. Process Of Digestion
  1. End-products
  2. Absorption
- D. Cell Respiration: Aerobic & Anaerobic
- E. Comparison Of Absorptive And Post-Absorptive States
- F. Metabolism Of Carbohydrates, Lipids, And Proteins
- G. Dissection Of A Whole Mammal Specimen And Location Of All Major Organs

XII. Respiratory System
- A. Functions
- B. Organs Of Respiratory Tract
  1. Structure
  2. Function
- C. Breathing Mechanism – Pressure And Volume Changes
  1. Inspiration
  2. Expiration
- D. Gas Exchange
  1. Alveoli of lungs
  2. Body tissues
- E. Blood Transport Of Gases
  1. Oxygen: Conditions under which hemoglobin loads and unloads oxygen
  2. Carbon dioxide
- F. Pleural Cavity And Pneumothorax
- G. Control Of Respiratory Rate

H. Role Of Respiratory System In Regulation Of Blood pH

XIII. Urinary System
- A. Functions
- B. Organs
- C. Nephron Structure
- D. Formation Of Urine
  - 1. Filtration
  - 2. Reabsorption
  - 3. Secretion
- E. Renin-Angiotensin Pathway And Role Of JGA
- F. Hormonal Regulation
  - 1. ADH
  - 2. Aldosterone
- G. Role Of Erythropoietin
- H. Urine – Characteristics, Components
- I. Dissection Of A Mammalian Kidney

XIV. Water, Electrolyte, And pH Balance
- A. Water Gain, Loss, And Balance
- B. Electrolyte Gain, Loss, And Balance
- C. pH Balance: Urinary And Respiratory Control

XV. Reproductive System
- A. Male
  - 1. Organs – structure, function
  - 2. Hormonal control
- B. Female
  - 1. Organs – structure, function
  - 2. Hormonal control
    - a. reproductive cycle
    - b. pregnancy
    - c. menopause

LEARNING MATERIALS:

Required textbook:

Tortora, Gerard. (2007). *Introduction to the Human Body: The Essentials of Human Anatomy and Physiology*. Benjamin Cummings Publishing Co.

Required laboratory manual:

Marieb, Elaine. (2009). *A Manual of Anatomy and Physiology: Cat Version*. Benjamin Cummings Publishing Co.

Other learning materials may be required and made available directly to the student and/or via the College's Libraries and/or course management system.

COURSE APPROVAL:

Prepared by:	Judith D. Cunningham Assistant Professor of Biology	Date:	4/1998
Revised by:	Christopher J. Harendza, Ph.D. Associate Professor and Coordinator of Biology	Date:	10/22/2004
Revised by:	Judith D. Cunningham, Asst. Professor of Biology	Date:	3/2009
Revised by:	Judith D. Cunningham, Asst. Professor of Biology	Date:	12/28/2012
VPAA/Provost or designee Compliance Verification:			
	Victoria L. Bastecki-Perez, Ed.D.	Date:	2/13/2013
Revised by:	Debbie Dalrymple	Date:	6/27/2016
VPAA/Provost or designee Compliance Verification:			
	Victoria L. Bastecki-Perez, Ed.D.	Date:	6/27/2016

This course is consistent with Montgomery County Community College's mission. It was developed, approved and will be delivered in full compliance with the policies and procedures established by the College.