



HUMAN PHYSIOLOGY

Revised 12/10/11

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<u>Course Number</u>	BIO 216
<u>Prerequisite(s)</u>	BIO 215 with a grade of "C" or better.
<u>Co-requisite(s)</u>	BIO 215
<u>Course Description</u>	<p>This course is a study of human physiological processes in relation to homeostasis. This course provides comprehensive coverage of the physiological vocabulary and principles necessary to understand the functions and interrelationships of the following systems: integumentary, skeletal, muscular, nervous (central and peripheral), endocrine, cardiovascular, lymphatic, respiratory, digestive, urinary, reproductive, and immune. Additional topics will include intermediary metabolism as well as fluid, electrolyte, and acid-base balance.</p>
<u>Course Outcomes:</u>	<p>Students should be able to demonstrate:</p> <ol style="list-style-type: none">1. Rationality, logic and coherence through critical thinking;2. Their ability to express themselves effectively in quantitative and qualitative terms;3. The scientific method of inquiry;4. Their ability to access, retrieve, synthesize and evaluate information.
<u>Textbook(s)</u>	<p>Fundamentals of Anatomy & Physiology. Frederic H. Martini. 9th Edition. 2012 Benjamin Cummings Pub. ISBN-10: 0321719794 ISBN-13: 9780321719799</p>
<u>References</u>	N/A
<u>Other Required Materials, Tools, and Equipment:</u>	<p>PhysioEx 8.0 for A&P: Laboratory Simulations in Physiology ISBN 0-321-54856-6 Any additional resources will be provided to the Student by the Instructor.</p>
<u>Method of Instruction:</u>	<p>Lecture, discussion, questioning, and laboratory sessions are the primary methods. Audio-visuals, interactive software, and internet resources may also be used.</p>

<u>Grading System:</u>	90 - 100	=	A
	80 - 89	=	B
	70 - 79	=	C
	60 - 69	=	D
	Below 60	=	F

<u>Grade Calculation Method:</u>	5 Lecture Exams	=	50%
	2 Laboratory Exams	=	30%
	Final Exam (required & comprehensive)	=	20%
		=	100%

Attendance Policy: See Student Handbook Pages 77-80
The withdrawal date for Spring semester will be 4/2/12.

Academic Conduct: **ACADEMIC DISHONESTY:**

Please See Student Handbook Page 98

CELLULAR PHONES AND PAGERS/BEEPERS:

Please See Student Handbook Pages 76-77

Class/Lab procedures:

Biology requires no one miss over 10 hours of lecture.

Preparation:

1. Read over the material before coming to class.
2. Come prepared to do the work each day.
3. Be in your place at the beginning of each class period.
4. Be considerate of your class associates.
5. **Use wooden pointers. Do not** use pens or pencils to point out features of models.
6. Reassemble models and return them to the appropriate place
7. Report immediately to the instructor any emergencies or injuries that occur.

Accommodations:

Students who need special accommodations in this class because of a documented disability should notify Student Disability Services by calling (864) 592-4818, toll-free 1-800-922-3679; via email through the SCC web site at www.sccsc.edu/resources/disabilities; or by visiting the office located in the East Building Room 30-B on the SCC Central campus. Contacting Student Disability Services early in the semester gives the College an opportunity to provide necessary support services and appropriate accommodations.

**COURSE
OUTCOMES &
OBJECTIVES:**

Demonstrate rationality, logic, and coherence through critical thinking; demonstrate their ability to express themselves effectively in written and oral communication; demonstrate their ability to express themselves effectively in quantitative and qualitative terms; demonstrate the scientific method of inquiry; and demonstrate their ability to access, retrieve, synthesize, and evaluate information.

I. Define metabolism and give specific examples of anabolism and catabolism.

- A. Describe the basic steps in glycolysis, the TCA cycle, and the electron transport chain and summarize the energy yield of each process. Define, explain, and give specific examples of reduction/oxidation reactions. Define substrate-level phosphorylation and oxidative phosphorylation.
- B. Differentiate between the absorptive and postabsorptive metabolic states and summarize the characteristics of each.
- C. Discuss the homeostatic mechanisms that maintain a relatively constant body temperature.

II. Describe the major functions of the endocrine system, to include:

- A. Explain the importance of intercellular communication and describe the various types of mechanisms involved.
- B. Compare the modes of intercellular communication used by the endocrine and nervous systems and discuss the functional significance of the differences between the two systems.
- C. Compare the major hormones and organs of production, the relationship between the central nervous system and endocrine system, and the effects of hypocrinism and hypercrinism..

III. Describe the composition of blood (plasma and formed elements) and explain the major functions of the blood.

IV. Describe the anatomical components and functional divisions of the nervous system.

- A. Explain membrane resting potential, graded potential and action potential.
- B. Describe the mechanisms of synaptic activity and information processing.

V. Describe the function of skeletal muscle tissue.

- A. Identify the components of the neuromuscular junction and summarize the events involved in the neural control of skeletal muscles.
- B. Describe the mechanisms involved in muscle contraction and factors affecting muscle function.
- C. Identify and explain the functional differences among skeletal muscle fibers, cardiac muscle cells, and smooth muscle cells.

VI. Explain the roles of white matter and gray matter in processing and relaying sensory

information and motor commands.

- A. Specify the components and functions of the afferent and efferent divisions of the nervous system and explain what is meant by the somatic nervous system.
- B. Describe the functions of the sympathetic division and the parasympathetic divisions of the autonomic nervous system.
- C. Discuss the relationship between the two divisions of the autonomic nervous system and the significance of dual innervation.

VII. Describe the sensory organs of smell, vision, taste, and hearing.

- A. Describe the functions of the internal structures of the eye including the production of nerve impulses and their pathway to the visual cortex of the brain.
- B. Describe the functions of the external, middle, and inner ear.

VIII. Describe the basic organization and functions of the cardiovascular system.

- A. Explain the conducting system of the heart, including action potential of cardiac muscle and the components of the intrinsic conducting system.
- B. Explain the events of the cardiac cycle, including: atrial and ventricular systole and diastole, opening and closing of heart valves, and heart sounds
- C. Define cardiac output, and describe the factors that influence this variable.
- D. Describe the variables that influence heart rate and stroke volume.
- E. Explain the mechanisms that regulate blood flow through arteries, capillaries, and veins.
- F. Describe the factors that influence and/or regulate blood pressure.
- G. Discuss the mechanisms and various pressures involved in the movement of fluid between capillaries and interstitial spaces.

IX. Describe the functions of the respiratory system.

- A. Define and compare the processes of external respiration and internal respiration.
- B. Explain the structural features of the respiratory membrane.
- C. Summarize the physical principles governing the movement of air into the lungs and the diffusion of gases into and out of the blood.

X. Describe the organs of the digestive system and explain their major functions.

- A. Explain the processes of digestion and absorption of nutrients in the various regions of the GI tract.
- B. Explain the hormonal regulatory mechanisms involved in the various regions of the GI tract.
- C. Describe the functions and regulation of the accessory digestive organs.

XI. Describe the functions of the urinary system.

- A. Describe the structure of the nephron and outline the processes involved in the formation of urine.
- B. Discuss the major functions of each portion of the nephron and collecting system.
- C. Describe the factors that influence net filtration pressure and the glomerular filtration rate.
- D. Describe how ADH, NP, and aldosterone influence the volume and concentration of urine.
- E. Describe the mechanism of selected antidiuretic drugs.

XII. Describe the principal components of the reproductive system and summarize their functions.

- A. Outline the processes of meiosis and spermatogenesis in the testes.
- B. Explain the roles of the male reproductive tract and accessory glands in the maturation, nourishment, storage, and transport of spermatozoa.
- C. Summarize the hormonal mechanisms that regulate male reproductive functions.
- D. Outline the processes of meiosis and oogenesis in the ovaries.
- E. Describe the functions of the ovaries, fallopian tubes, uterus, and vagina.
- F. Summarize the anatomical, physiological, and hormonal aspects of the female reproductive cycle.

XIII. Explain the functions of the major components of the immune system.

- A. Describe the components and mechanisms of specific defenses.
- B. Describe the components and mechanisms of nonspecific defenses.
- C. Distinguish between cell-mediated (cellular) immunity and antibody-mediated (humoral) immunity.
- D. Explain the origin of autoimmune disorders, immunodeficiency diseases, and allergies and list important examples of each type of disorder.

XIV. Explain what is meant by the terms fluid balance, electrolyte balance, and acid–base balance and discuss their importance in homeostasis.

- A. Compare the ionic composition of intracellular and extracellular fluids.
- B. Explain the basic concepts involved in the regulation of fluids and electrolytes.
- C. Identify the hormones that play important roles in regulating fluid balance and electrolyte balance and describe their effects.
- D. Explain the buffering systems that balance the pH of the intracellular and extracellular fluids.