

College of San Mateo
Official Course Outline

1. **COURSE ID:** BIOL 260 **TITLE:** Human Physiology **C-ID:** BIOL 120B
Units: 5.0 units **Hours/Semester:** 48.0-54.0 Lecture hours; 96.0-108.0 Lab hours; and 96.0-108.0 Homework hours
Method of Grading: Letter Grade Only
Prerequisite: BIOL 250, or equivalent and CHEM 192, CHEM 210 or CHEM 410 or the equivalent.
Recommended Preparation:
Eligibility for ENGL 100, or Eligibility for ENGL 105 and Eligibility for MATH 110 Eligibility for elementary algebra as determined by appropriate method such as multiple measures, self-assessment and consultation with an academic counselor.

2. **COURSE DESIGNATION:**
Degree Credit
Transfer credit: CSU; UC
AA/AS Degree Requirements:
CSM - GENERAL EDUCATION REQUIREMENTS: E5a. Natural Science
CSU GE:
CSU GE Area B: SCIENTIFIC INQUIRY AND QUANTITATIVE REASONING: B2 - Life Science
CSU GE Area B: SCIENTIFIC INQUIRY AND QUANTITATIVE REASONING: B3 - Laboratory Activity
IGETC:
IGETC Area 5: PHYSICAL AND BIOLOGICAL SCIENCES: B: Biological Science
IGETC Area 5: PHYSICAL AND BIOLOGICAL SCIENCES: C: Science Laboratory

3. **COURSE DESCRIPTIONS:**
Catalog Description:
Functions of the organs and systems of the human body. (Intended for students of nursing, physiotherapy, physical education/kinesiology, psychology and related fields. Elective for pre-dental, pre-medical, and pre-veterinary students.) Extra supplies may be required.

4. **STUDENT LEARNING OUTCOME(S) (SLO'S):**
Upon successful completion of this course, a student will meet the following outcomes:
 1. Describe the interactive functions of key homeostatic mechanisms.
 2. Describe cellular activity using chemical and physical principles.
 3. Relate cellular activity to the functioning of specific body tissues and organs.
 4. Distinguish between normal physiological changes and common pathological changes in the body.
 5. Use quantitative information to evaluate and understand physiological processes.

5. **SPECIFIC INSTRUCTIONAL OBJECTIVES:**
Upon successful completion of this course, a student will be able to:
 1. Explain the functional characteristics common to humans and the importance of each to maintaining life. Include homeostasis, positive and negative feedback mechanisms, the chemistry of water and its importance to living systems, the role of dehydration synthesis and hydrolysis in the formation and breakdown of organic molecules, the role of ATP in cell metabolism, the structural and functional divisions of the nervous system.
 2. Distinguish and compare the general structures and biological functions of various organic molecules, the four types of body tissues, endocrine glands and exocrine glands, pathophysiological conditions that may arise from hypersecretion or hyposecretion of a hormone, meiosis and mitosis, passive transport and active transport, nonspecific body defenses and specific defenses, excitation-contraction process in skeletal, cardiac and smooth muscle, functions of neuroglial cells and neurons, the somatic and autonomic nervous system, receptor mechanisms for the various senses, events and goals of the absorptive and postabsorptive states. Also include relative fluid volume and solute composition of the fluid compartments of the body, female and male hormonal responses.
 3. Describe the function of various cell organelles, cell growth and reproduction, protein synthesis, the role of the plasma membrane in cells' interactions with their environment, the sliding filament theory of muscle contraction, resting membrane potential, how action potentials are generated and propagated along neurons, reflex activity, the process of hemostasis, the basis of transfusion reactions, the structural

characteristics and functions of blood components, control of respiration, transport of respiratory gases, mechanisms to regulate electrolyte and water balance, buffer systems of the body, adjustments of the infant to extrauterine life, events that lead to genetic variability of gametes.

4. Recognize and name the stages of mitosis and meiosis, atomic and molecular structures, diagnostic blood tests, parts of an EKG tracing, the important events and products of glycolysis, the Krebs cycle and the electron transport chain.
5. Define and compare acidosis and alkalosis resulting from respiratory and metabolic factors, parasympathetic and sympathetic responses, basal metabolic rate and total metabolic rate.
6. Apply knowledge to solve problems illustrating Mendelian genetics, transport of respiratory gases, enzyme activity, osmosis and diffusion, transfusion reactions, analysis of EKG tracings.
7. Demonstrate basic laboratory skill for the investigation of physiological phenomena including use of light microscope, diagnostic kits (cholesterol, urinalysis), computerized data acquisition (Vernier). Demonstrate use of tools for metric measurement of length and volume. Demonstrate accurate observation and recording of results, cooperative group preparation, analysis of simulations and hands-on labs using the scientific process.
8. Demonstrate an understanding of scientific method principals and use of research skills for physiological topics.
9. Communicate explanations of physiological phenomena both in writing and orally.

6. COURSE CONTENT:

Lecture Content:

- 1) Concept of homeostasis, necessary life functions, levels of structural organization
- 2) Chemistry review, patterns of chemical reactions, chemical composition of living matter
- 3) Cellular physiology, cell division, cell cycle control, cell structure and genetic control
- 4) Membrane transport and membrane potential, intercellular communication and signal transduction
- 5) Principles of metabolism: endergonic and exergonic reactions, activation energy, energy coupling, enzyme catalysis, cellular respiration and fermentation
- 6) Neuronal physiology, central nervous system, peripheral nervous system, neuronal control of involuntary effectors, functions of the autonomic nervous system
- 7) Sensory physiology
- 8) Principles of endocrinology, including regulation of reproductive organs
- 9) Muscle Physiology, molecular basis of muscle contraction, skeletal muscle metabolism
- 10) Cardiac physiology, blood vessels and blood pressure
- 11) Blood functions and body defenses, immune system
- 12) Respiratory physiology
- 13) Digestive system and regulation of metabolism, energy balance and temperature regulation
- 14) Urinary system, electrolytes, fluid and acid-base balance
- 15) Reproduction physiology, principles of heredity, and human development

Lab Content:

- 1) Lab investigations of homeostatic principles
- 2) Lab investigation of common metrics used in physiology
- 3) Lab investigation of solutions and chemical concepts used in physiology.
- 4) Lab investigation of diet, nutrition, and metabolic balance
- 5) Lab investigation of cellular functions of membrane transport, membrane potentials, and ion channels.
- 6) Lab investigations of heredity and genetic control systems
- 7) Lab investigations of the senses.
- 8) Lab investigations of skeletal muscle physiology
- 9) Lab investigations of chemical and physical processes of digestion
- 10) Lab investigations of endocrine control mechanisms
- 11) Lab investigations of cardiovascular system
- 12) Lab investigations of physical and chemical aspects of pulmonary function
- 13) Blood analysis
- 14) Lab investigations of innate immunity and adaptive immunity
- 15) Lab investigation of urine and regulation of fluid and electrolyte balance

7. REPRESENTATIVE METHODS OF INSTRUCTION:

Typical methods of instruction may include:

- A. Lecture
- B. Lab

- C. Discussion
- D. Experiments
- E. Observation and Demonstration
- F. Other (Specify): Online activities

8. REPRESENTATIVE ASSIGNMENTS

Representative assignments in this course may include, but are not limited to the following:

Writing Assignments:

- 1) Students are required to write lab reports during the semester. The reports reflect an understanding of the scientific method and may include hypothesis statements, results of data collection, evidence of data analysis, and reporting of conclusions and physiological concepts.
- 2) Students are required to write short answers to questions, and write essays and discussion posts addressing physiological concepts in a variety of assignments.
- 3) Each exam requires written answers to physiological concept questions. For example: "Discuss several ways that the nervous system and endocrine system overlap in function."

Reading Assignments:

- 1) Textbook: Students are expected to read approximately one chapter from the textbook each week.
- 2) Laboratory: Students must read the background and instructions for each lab.
- 3) Scientific journals: Students are expected to read scientific journal articles from the primary scientific literature for research projects. A comprehensive understanding of the article is not required but the students should be able to accurately identify the hypothesis and summarize the major findings.

Other Outside Assignments:

- 1) Students may be required to do online assignments, including interacting with animations or video content, participating in discussions, researching clinical cases or pathophysiologies.
- 2) Students may be required to use laboratory simulations.
- 3) Students may be assigned case studies or clinical problems to research and present to their peers.

9. REPRESENTATIVE METHODS OF EVALUATION

Representative methods of evaluation may include:

- A. Class Performance
- B. Exams/Tests
- C. Group Projects
- D. Homework
- E. Lab Activities
- F. Oral Presentation
- G. Papers
- H. Portfolios
- I. Projects
- J. Quizzes
- K. Research Projects
- L. Written examination
- M. Quizzes and exams may include the following formats: multiple choice, fill-in questions, matching, short answer and essay questions, and quantitative problem solving. Reports and portfolio projects may include data collection, reporting results, quantitative analysis, construction of tables and graphs, research and citing references from peer-reviewed scientific literature. Group projects may include classroom presentations, including preparation of posters, oral presentations and electronic presentations.

10. REPRESENTATIVE TEXT(S):

Possible textbooks include:

- A. Fox, Stuart I., and Rompolksi, Krista. *Human Physiology*, 16th ed. WCB/McGraw Hill, 2022
- B. Marieb, Elaine, Hoehn, Katja. *Human Anatomy and Physiology*, 11th ed. Benjamin Cummings with Mastering A & P, 2019
- C. Silverthorn, D. *Human Physiology*, 8th ed. Benjamin Cummings, 2019

Possible manuals include:

- A. Fox, Stuart I.. *A Laboratory Guide to Human Physiology*, McGraw Hill, 01-01-2022

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Course Originator: Theresa Martin

