

BUTTE COLLEGE

COURSE OUTLINE

I. CATALOG DESCRIPTION

BIOL 21 - Human Physiology

4 Unit(s)

Prerequisite(s): BIOL 20 and CHEM 110, or CHEM 1, or CHEM 51

Recommended Prep: Reading Level IV; English Level IV; Math Level IV

Transfer Status: CSU/UC

51 hours Lecture

51 hours Lab

Study of the physiological principles, function, integration and homeostasis of the human body at the cellular, tissue, organ, organ system and organism level: integumentary system, bone, skeletal, smooth and cardiac muscles, nervous system, sensory organs, cardiovascular system, lymphatic and immune systems, respiratory system, urinary system, digestive system, endocrine system, and reproductive system. This course is primarily intended for Nursing, Allied Health, Kinesiology, and other health related majors. (C-ID BIOL 120B).

II. OBJECTIVES

Upon successful completion of this course, the student will be able to:

- A. Describe and distinguish various roles of major classes of biomolecules in living cells.
- B. Describe key functional features of different types of human cells and how they communicate.
- C. Identify key functions of major organ systems and the physiological mechanisms underlying their operation.
- D. Demonstrate an understanding of how organ systems of the body are integrated and regulated.
- E. Demonstrate an understanding of how homeostasis is maintained in the body.
- F. Demonstrate knowledge of metabolic and physiological disorders of the major organ systems.
- G. Analyze experimental data to demonstrate physiological principles.
- H. Demonstrate an understanding of the scientific method, experimental design, and the philosophy of science. Apply the scientific method and philosophy of science by designing components of and carrying out physiological experiments.

III. COURSE CONTENT

A. Unit Titles/Suggested Time Schedule

Lecture	
<u>Topics</u>	<u>Hours</u>
1. The chemistry of life	2.00
2. Homeostasis and feedback systems	2.00
3. Cell membrane, and cell-cell communication	2.00
4. Major body control systems	2.00
5. Functions of the integumentary system	2.00
6. Role of bone tissue in homeostasis	2.00
7. Skeletal muscle structure and function	2.00
8. Membrane potential and action potentials	2.00
9. Nervous system and integration	2.50
10. Sense organ function	2.50
11. Heart and cardiac cycle	2.50

12. Cardiovascular system function and regulation	2.50
13. Lymphatic system functions and immunity	2.50
14. Respiratory system function and regulation	2.50
15. Urinary system function and regulation	2.50
16. Water, electrolyte and acid-base balance	2.50
17. Digestion and nutrition	2.50
18. Metabolism	2.50
19. Thermoregulation	2.50
20. Endocrine functions and regulation	2.50
21. Reproductive functions and regulation	2.50
22. Clinical applications	2.50
Total Hours	51.00

Lab

<u>Topics</u>	<u>Hours</u>
1. The chemistry of life	2.00
2. Homeostasis and feedback systems	2.00
3. Cell membrane, and cell-cell communication	2.00
4. Major body control systems	2.00
5. Functions of the integumentary system	2.00
6. Role of bone tissue in homeostasis	2.00
7. Skeletal muscle structure and function	2.00
8. Membrane potential and action potentials	2.00
9. Nervous system and integration	2.50
10. Sense organ function	2.50
11. Heart and cardiac cycle	2.50
12. Cardiovascular system function and regulation	2.50
13. Lymphatic system functions and immunity	2.50
14. Respiratory system function and regulation	2.50
15. Urinary system function and regulation	2.50
16. Water, electrolyte and acid-base balance	2.50
17. Digestion and nutrition	2.50
18. Metabolism	2.50
19. Thermoregulation	2.50
20. Endocrine functions and regulation	2.50
21. Reproductive functions and regulation	2.50
22. Clinical applications	2.50
Total Hours	51.00

IV. METHODS OF INSTRUCTION

- A. Lecture
- B. Instructor Demonstrations
- C. Class Activities
- D. Reading Assignments
- E. Multimedia Presentations
- F. Laboratory Experiments
- G. Homework: Students are required to complete two hours of outside-of-class homework per week for each course unit

V. METHODS OF EVALUATION

- A. Quizzes
- B. Class participation
- C. Lab Projects
- D. Written Assignments
- E. Midterm and final examinations that include a written component which requires students to effectively communicate comprehension of material presented and critical thinking skills
- F. Laboratory practical exams

VI. EXAMPLES OF ASSIGNMENTS

- A. Reading Assignments
 - 1. Read through the information given on hormone axes. Be prepared to design a chart that will be used to determine exposure to unknown hormones.
 - 2. Read through the chapter section on electrical activity in myocardial cells. Be prepared to compare and contrast between skeletal myofibers, contractile myocardial cells, and nodal cells.
- B. Writing Assignments
 - 1. For each of the skeletal myofiber structures listed in the assignment indicate 1) where it is found or describe its structure, 2) indicate its specific role in the contraction process, and 3) make a prediction on how the contraction process would be altered if the structure were missing or non-functional.
 - 2. Watch a movie or television series that utilizes scientific or medical terminology. Prepare a short, 250 word critique on the writer's accuracy in usage of proper terminology.
- C. Out-of-Class Assignments
 - 1. Using the Goldman-Hodgkin-Kats (GHK) equation, calculate the membrane voltage for each of the conditions listed: changes in ECF sodium concentration $[Na]_{out}$, changes in ECF potassium concentration $[K]_{out}$, changes in sodium permeability (PNa), and changes in potassium permeability (PK).
 - 2. Look at the ingredient labels for various foods or drinks found at a grocery store. Research an ingredient that is unfamiliar to you then be prepared to discuss what you have learned at the next class meeting.

VII. RECOMMENDED MATERIALS OF INSTRUCTION

Textbooks:

- A. Wood., K. & Newman, K.. Biology 21, Human Physiology Lab Guide. 1st Edition. Butte College Press, 2009.
- B. Stanfield, C., Germann, W.. Principles of Human Physiology. 4th Edition. Pearson Benjamin Cummings, 2013.

Materials Other Than Textbooks:

- A. Supplemental materials provided by the instructor, library, or online learning resource.

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