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Biology (BIOL) 2259 Human Anatomy & Physiology II (5 Units) CSU

Prerequisite: Successful completion of BIOL 2258 with a 'C' or better.

Advisory: Eligibility for English 1500, Math 1500, and successful completion of CHEM 1510 and BIOL 1500 or BIOL 1510 strongly recommended

Hours and Unit Calculations:

Total Hours 48 hours lecture (96 Outside of class hours); 96 hours lab (192 Total Student Learning Hours) 5 Units

Catalog Description: This is the second semester of a one-year course sequence which examines the physiological principles, function, organization, integration and homeostasis of the human body at the cellular, tissue, organ, organ system and organismal level: endocrine, cardiovascular, lymphatic, respiratory, digestive, excretory, and reproductive system. This course is primarily intended for Nursing, Allied Health, Kinesiology, and other health related majors. Not open to students who have credit of C or better in Biology 2250 and/or Biology 2257.

Type of Class/Course: Degree Credit

Texts: Tortora, Gerard J. and Bryan H. Derrickson. *Principles of Anatomy and Physiology* 14th ed. Hoboken: John Wiley & Sons, Inc. 2014.

Additional Required Materials:

Allen and Harper. *Laboratory Manual for Anatomy and Physiology*. 6<sup>th</sup> ed. John Wiley & Sons, 2017.

Instructor syllabus and individual handouts for each laboratory exercise.

Course Objectives:

By the end of the course, a successful student will be able to:

1. Describe and distinguish various roles of major classes of biomolecules in living cells,
2. Describe key functional features of different types of human cells and how they communicate,
3. Distinguish between the major tissue types,
4. Identify structures and functions of major organ systems and the physiological mechanisms underlying their operation,
5. Relate structure and function at the cellular through system levels of organization of human body systems,

6. Demonstrate an understanding of how organ systems of the body are integrated and regulated,
7. Demonstrate an understanding of how homeostasis is maintained in the body,
8. Demonstrate knowledge of metabolic and physiological disorders of the major organ systems,
9. Describe structural or anatomical changes that occur in disease, injury, or gaining of the human body systems,
10. Demonstrate the ability to identify and palpate structures of the human body,
11. Analyze experimental data to demonstrate physiological properties, and
12. 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.

#### Course Scope and Content:

- Unit I                    Endocrine System
- A. Comparison of the endocrine and nervous system function and regulation
  - B. Cell to cell communication
  - C. Distinction between endocrine and exocrine glands
  - D. Control of the secretion of hormones
  - E. Pituitary gland hormones and their functions
  - F. Non-pituitary gland hormones and their functions
  - G. Clinical application
  - H. Role of the Endocrine system in maintaining homeostasis
- Unit II                    Cardiovascular System: Blood and Lymph
- A. Functions and regulation of the cardiovascular system
  - B. Components of the cardiovascular system
  - C. Primary function of blood and lymph
  - D. Components of blood: plasma and formed elements
  - E. Life cycle of erythrocytes
  - F. Hemostasis: vascular spasm, platelet plug, coagulation
  - G. Anticoagulant and thrombolytic agents used in hemostasis
  - H. ABO and Rh blood groups
  - I. Transfusion reactions
  - J. Hemolytic disease of the newborn
  - K. Common disorders of the clotting mechanisms
  - L. Formation and circulation of lymph
  - M. Clinical application
- Unit III                    Cardiovascular System: Heart
- A. Heart anatomy
  - B. The heart beat and nodal tissue
  - C. Characteristics of cardiac muscle tissue
  - D. Systemic and pulmonary circuit
  - E. The Cardiac cycle and electrocardiogram
  - F. Factors that control cardiac output
  - G. Alterations of heart rate and rhythm
  - H. Heart sounds
  - I. Clinical application

- Unit IV      Cardiovascular System: Blood Vessels
- A. Categories and functions of blood vessels
  - B. Factors that affect blood pressure
  - C. Factors that control pressure, flow, and velocity of fluid in a vessel
  - D. Blood distribution in the Cardiovascular system
  - E. Pulse Points
  - F. Types of shock
  - G. Systemic circulation through arteries
  - H. Systemic circulation through veins
  - I. Hepatic portal circulation
  - J. Fetal circulation
  - K. Common disorders that affect the cardiovascular system: hypertension, hypotension, and shock
  - L. Clinical application
- Unit V      Lymphatic System and Immunity
- A. Lymphatic system structure and function
  - B. Innate Immunity
  - C. Adaptive Immunity
  - D. Cell-Mediated Immunity
  - E. Antibody-Mediated Immunity
  - F. Immunological Memory
  - G. Allergy and hypersensitivity
  - H. Clinical application
- Unit VI      The Respiratory System
- A. Function, regulation, and components of the respiratory system
  - B. Lung volumes and capacities
  - C. Exchange and transport of respiratory gases
  - D. Control of breathing
  - E. Respiratory system disorders
  - F. Clinical application
- Unit VII      Digestive System
- A. Function and components of the digestive system
  - B. Function and control of specific digestive organs: mouth, pharynx, esophagus, stomach, small intestine, large intestine, pancreas, liver, and gall bladder
  - C. Digestion in the small intestine
  - D. Intermediary metabolism overview
  - E. Digestive system disorders
  - F. Clinical application
- Unit VIII      Urinary System
- A. Function, regulation and components of the Urinary System
  - B. Microscopic structure of the nephron
  - C. Renal physiology: glomerular filtration, tubular reabsorption, and tubular secretion
  - D. Regulation of electrolyte and water balance in the body
  - E. Production of hypertonic vs. hypotonic urine

- F. Urine transport, storage and elimination
- G. Urinary System disorders
- H. Clinical application

- Unit IX      The Reproductive System
- A. Development of the Reproductive Systems
  - B. Sex determination
  - C. Formation of gametes by Meiosis
  - D. Spermatogenesis vs. Oogenesis
  - E. Overview of function, regulation and components of the female and male reproductive system
  - F. Physiology of an erection and ejaculation
  - G. Constituents of ejaculate
  - H. Pathway of oocyte
  - I. Phases of the female reproductive cycle
  - J. Role of hormones and prostaglandins in reproduction
  - K. Clinical application

Course Scope and Content: Laboratory

- Unit I      Anatomy of the Endocrine System
- A. Identification of Endocrine glands
  - B. Torso Models
  - C. Neurohypophysis, adenohipophysis
- Unit II      Cardiovascular System: Heart
- A. Heart structure identification
  - B. Heart Models
  - C. Dissection of Sheep heart
  - D. Evaluation of a normal EKG, heart sounds and pulse wave
  - E. Determination of cardiovascular fitness with physical exercise
- Unit III      Cardiovascular System: Blood
- A. Evaluation of formed element morphology: RBC, WBC and platelets
  - B. Determination of hemoglobin content
  - C. Determination of hematocrit
  - D. Evaluation of hemostasis: bleeding time, coagulation time, triple response
  - E. ABO blood type determination
  - F. Blood compatibility and transfusion
- Unit IV      Cardiovascular System: Blood Vessels
- A. Blood vessel identification
  - B. Circulatory system models
  - C. Determination of arterial blood pressure
  - D. Determination of venous pressure
  - E. Evaluation of one-way valves in veins
  - F. Determination of capillary flow: white reaction, red reaction, red flare
  - G. Hyperemia and microcirculation
  - H. Determination of vascular fitness

- Unit V            Respiratory System
- A. Identification of respiratory organs
  - B. Conductive vs. respiratory division identification
  - C. Respiratory tree models
  - D. Lung models
  - E. Determination of respiratory volumes and capacities using a spirometer
  - F. Evaluation of the regulation of acid-base balance through the process of respiration
  - G. Fetal pig dissection
- Unit VI            Digestive System
- A. Identification of digestive organs
  - B. Experimentation on enzyme activity
  - C. Digestive physiology lab
  - D. Fetal pig dissection
- Unit VII           Urinary System
- A. Identification of urinary system organs
  - B. Kidney models
  - C. Blood pressure as it relates to blood composition
  - D. Urinalysis examination
- Unit VIII          Cell Division
- A. Analysis and drawing of the stages of Mitosis
  - B. Analysis and drawing of the stages of Meiosis I and Meiosis II
  - C. Drawing of the cell cycle
- Unit IX            Reproductive System
- A. Identification of the organs of the male and female reproductive systems
  - B. Female reproductive system models
  - C. Male reproductive system models
  - D. Spermatogenesis vs Oogenesis
  - E. Microscopic observation of mature human sperm
  - F. Microscopic observation of spermatogenesis in rat testes
  - G. Microscopic observation of oogenesis in cat ovaries

#### Learning Activities Required Outside of Class

The students in the class will spend a minimum of 6 hours per week outside of the regular class time doing the following:

1. Studying course lecture notes, handouts, and textbook reading,
2. Answering question on study assignments,
3. Completing required reading as assigned, and
4. Completing written work as assigned.

#### Methods of Instruction

1. Assigned reading from text and selected references

2. Lectures and demonstrations given by instructor using models, charts, multimedia, and preserved specimens.
3. Dissection of selected organs
4. Multimedia presentations
5. IPAD flashcards
6. Practice lab exams
7. Performance of laboratory exercises under direct supervision of the instructor

#### Methods of Evaluation

1. Substantial writing assignments, including:
  - a. Focus questions
  - b. Essay exams
  - c. Laboratory reports
2. Computational or non-computational problem-solving demonstrations, including:
  - a. Unit exams
  - b. Lecture and lab quizzes
3. Skills demonstrations, including:
  - a. Dissection
  - b. Construction of muscles using Clay Maniken's
4. Proctored, closed book/closed note examinations that include:
  - a. Multiple choice
  - b. Completion
  - c. Identification
    - i. Surface anatomy
    - ii. Models, charts, preserved specimens

#### Laboratory Category: Extensive Laboratory

Pre delivery criteria: All of the following criteria are met by this lab.

1. Curriculum development for each lab.
2. Published schedule of individual laboratory activities.
3. Published laboratory activity objectives.
4. Published methods of evaluation.
5. Supervision of equipment maintenance, laboratory setup, and acquisition of lab materials and supplies.

During laboratory activity of the laboratory: All of the following criteria are met by this lab.

1. Instructor is physically present in lab when students are performing lab activities.
2. Instructor is responsible for active facilitation of laboratory learning.
3. Instructor is responsible for active delivery of curriculum.
4. Instructor is required for safety and mentoring of lab activities.
5. Instructor is responsible for presentation of significant evaluation.

Post laboratory activity of the laboratory: All of the following criteria are met by this lab.

1. Instructor is responsible for personal evaluation of significant student outcomes (lab exercises, exams, practicals, notebooks, portfolios, etc.) that become a component of the student grade that cover the majority of lab exercises performed during the course.
2. Instructor is responsible for supervision of laboratory clean up of equipment and materials.

## Supplemental Data:

TOP Code:	04100: Anatomy and Physiology
SAM Priority Code:	E: Non-Occupational
Distance Education:	N/A
Funding Agency:	Y: Not Applicable(funds not used)
Program Status:	1: Program Applicable
Noncredit Category:	Y: Not Applicable, Credit Course
Special Class Status:	N: Course is not a special class
Basic Skills Status:	N: Course is not a basic skills course
Prior to College Level:	Y: Not applicable
Cooperative Work Experience:	N: Is not part of a cooperative work experience education program
Eligible for Credit by Exam:	No
Eligible for Pass/No Pass:	C: Pass/No Pass
Taft College General Education:	LNS: Local GE Natural Science
Disciplines List:	Biology, Nursing