

# **El Camino College**

# **COURSE OUTLINE OF RECORD - Official**

# I. GENERAL COURSE INFORMATION

Subject and Number: Descriptive Title:	Physiology 31 Human Physiology	
Course Disciplines:	Biological Sciences	
Division:	Natural Sciences	
Catalog Description:	This course is a study of cellular physiology and the functional aspects of the following human body systems: circulatory, respiratory, digestive, excretory, reproductive, muscle, nervous and endocrine. In the laboratory, experiments are performed to demonstrate principles discussed in lecture. This course is designed primarily for those majoring in the Health Sciences.	

# Conditions of Enrollment: Prerequisite

Anatomy 32 AND
Chemistry 20 or
Chemistry 21A or
Chemistry 4 with a minimum grade of C in each prerequisite course

Course Length: Hours Lecture: Hours Laboratory: Course Units:	X Full Term Other (S 2.00 hours per week T 6.00 hours per week T 4.00	Specify number of weeks): BA BA	
Grading Method: Credit Status	Letter Associate Degree Credit		
Transfer CSU: Transfer UC:	<ul> <li>X Effective Date: Prior to July 1992</li> <li>X Effective Date: Prior to July 1992</li> </ul>		
General Education:			
El Camino College:	1 – Natural Sciences		
	Term:	Other:	
CSU GE:	B2 - Life Science		
	Term: Fall 1991	Other:	

#### **B3 - Laboratory Sciences**

Term: Fall 1991

Other:

**IGETC:** 

## 5B - Biological Science with a Lab

Term: Fall 1991

Other:

# **II. OUTCOMES AND OBJECTIVES**

A. COURSE STUDENT LEARNING OUTCOMES (The course student learning outcomes are listed below, along with a representative assessment method for each. Student learning outcomes are not subject to review, revision or approval by the College Curriculum Committee)

- 1. Students will demonstrate how the different body systems interact to maintain water balance.
- 2. Students will demonstrate how the different body systems interact to maintain water balance.

The above SLOs were the most recent available SLOs at the time of course review. For the most current SLO statements, visit the El Camino College SLO webpage at <a href="http://www.elcamino.edu/academics/slo/">http://www.elcamino.edu/academics/slo/</a>.

# B. Course Student Learning Objectives (The major learning objective for students enrolled in this course are listed below, along with a representative assessment method for each)

1. Explain the major functions of human body systems.

**Objective Exams** 

2. Compare and contrast the different cell types, tissues, and organs that compose the body systems and their functions.

**Objective Exams** 

3. Explain the basic types of chemical reactions and interactions among and within cells that occur in the body.

Objective Exams

4. Explain how the body systems work together as a whole.

**Objective Exams** 

5. Compare and contrast the methods whereby the body maintains homeostasis.

**Objective Exams** 

6. Describe clinical disorders related to the topics discussed, as well as current treatments. Analyze case studies related to these disorders.

**Objective Exams** 

# III. OUTLINE OF SUBJECT MATTER (Topics are detailed enough to enable a qualified instructor to determine the major areas that should be covered as well as ensure consistency from instructor to instructor and semester to semester.)

Lecture or	Approximate	Topic	Major Topic
Lab	Hours	Number	
Lecture	1	I	Physiology Introduction A. Levels of Organization

			B. Homeostasis C. Scientific Method
Lab	6	II	Laboratory Activities A. Metric Measurements B. Scientific Method
Lecture	2	III	Chemical Principles A. Atoms and Molecules 1. Composition 2. Bonding B. Acids, Bases and Neutral Solutions C. Inorganic versus Organic Molecules D. Energy in Cells E. Basic Chemical Reactions 1. Intracellular 2. Extracellular F. Enzymes 1. Role 2. Regulation
Lab	9	IV	Laboratory Activities A. Molecule Construction
Lecture	3	V	Cells A. Cell Organelles B. Movement across Membranes 1. Osmosis 2. Diffusion 3. Active transport 4. Pinocytosis 5. Phagocytosis 6. Facilitated diffusion C. Genetic Control of Protein Synthesis D. Genes 1. Structural 2. Operator 3. Regulator E. Structure of DNA and RNA F. Reproduction 1. Mitosis 2. Meiosis
Lab	9	VI	Laboratory Activities A. Cell Transport
Lecture	4	VII	Blood and Lymph A. Blood 1. Components 2. Blood buffer system B. Red Blood Cells C. Hemoglobin 1. Structure 2. Role in transport D. Erythropenia and Anemia E. White Blood Cells 1. Type 2. Function 3. White blood counts F. Coagulation 1. Mechanism of action 2. Factors in process G. Capillary Membrane

			<ul> <li>H. Blood Types</li> <li>I. Allergic Response</li> <li>J. Organ Transplantation</li> <li>K. Lymphatic System</li> <li>1. Circulation pattern</li> <li>2. Function</li> <li>3. Mechanism of lymph formation</li> <li>L. Inflammatory Response</li> <li>M. Immune Response</li> <li>1. Cell-mediated response</li> <li>2. Antibody-mediated response</li> <li>3. Role of B and T cells</li> <li>N. Pathology of the Lymphatic System</li> </ul>
Lab	9	VIII	Laboratory Activities A. Blood Analysis B. Blood Cell Count and Blood Typing
Lecture	4	IX	Circulatory System A. Heart 1. Pumping action and regulation 2. Common disorders and treatment 3. Arterial blood pressure a. Cause b. Regulation c. Hypertension 4. Arteries, capillaries and veins a. Blood pressure, velocity and surface area B. Blood Flow 1. Systemic circulation 2. Regulation 3. Circulation time 4. Cardiac output C. ECG
Lab	12	Х	Laboratory Activities A. Electrocardiography B. Frog Heart Manipulation C. Blood Pressure Measurements
Lecture	3	XI	Respiratory System A. Mechanics of Respiration B. Cellular Events and Gas Transport C. Regulation D. Respiratory Abnormalities E. Respiratory Volumes and Capacities F. Regulation G. Clinical Problems
Lab	6	XII	Laboratory Activities A. Respiratory Capacity B. Respiratory Mechanics
Lecture	3	XIII	Digestive System A. Biochemical Molecules 1. Structure: carbohydrates, fats, proteins 2. Function B. Breakdown Processes and Energy Utilization C. Glycolysis D. Aerobic Metabolism E. Citric Acid Cycle F. Cytochrome Oxidase System

			G. ATP formation H. Clinical Problems
Lab	6	XIV	Laboratory Activities A. Digestive Processes
Lecture	3	XV	Urinary System A. Kidney 1. Function 2. Mechanism of action B. Urine 1. Formation 2. Normal components 3. Abnormal components C. Micturition D. Acidosis and Ketosis
Lab	9	XVI	Laboratory Activities A. Urinalysis B. Renal Physiology C. Acid-Base balance
Lecture	3	XVII	Muscle System A. Muscle Contraction 1. Chemical description 2. Twitches 3. Summation 4. Tetanus 5. Fatigue B. Types of Muscle and Contraction 1. Skeletal 2. Smooth 3. Cardiac C. Isotonic and Isometric Contractions
Lab	6	XVIII	Laboratory Activities A. Skeletal Muscle Physiology B. Electromyography
Lecture	5	XIX	Nervous System A. Nerves 1. Properties 2. Membrane potentials 3. Neuronal circuits 4. Nerve impulse 5. Somesthetic sensations B. Motor Function 1. Brain 2. Spinal cord 3. Brain stem C. Brain Functions 1. Cerebral cortex 2. Basal ganglia 3. Ventricles 4. Cranial nerves D. Spinal Cord 1. Location 2. Function 3. Disorders E. Autonomic Nervous System and Hypothalamus 1. Structure 2. Function

	Total Hours	144	
Total	Laboratory Hours	108	
Тс	otal Lecture Hours	36	
Lab	9	XXIV	Laboratory Activities A. Genetic Problems B. Inheritance Simulation C. DNA Replication and Protein Synthesis
Lecture	2	XXIII	Reproductive System A. Components: male and female 1. Structure 2. Function B. Fertilization C. Embryo and Fetus 1. Developmental processes D. Birth 1. Process 2. Methods of delivery E. Lactation
Lab	6	XXII	Laboratory Activities A. Endocrine Hormones
Lecture	3	XXI	Endocrine System A. Hypothalamus and Hypophysis 1. Function 2. Interrelationship 3. Regulation B. Hormones 1. Function 2. Disorders
Lab	21	XX	Laboratory Activities A. Reflex Physiology B. Neurophysiology C. General Sensations D. Cranial Nerves E. Vision F. Hearing and Equilibrium G. Taste and Smell
			<ul> <li>F. Intellectual Process</li> <li>G. Sleep and Wakefulness</li> <li>H. Behavioral Patterns</li> <li>I. Psychomatic Reaction</li> <li>J. Eye and Ear</li> <li>1. Structures</li> <li>2. Functions</li> <li>3. Abnormalities</li> <li>4. Characteristics of visual acuity</li> <li>a. Peripheral vision</li> <li>b. Color vision</li> <li>c. Near point accommodation</li> <li>K. Touch, Taste and Smell</li> </ul>

# IV. PRIMARY METHOD OF EVALUATION AND SAMPLE ASSIGNMENTS

# A. PRIMARY METHOD OF EVALUATION:

Problem solving demonstrations (computational or non-computational)

# B. TYPICAL ASSIGNMENT USING PRIMARY METHOD OF EVALUATION:

In the space provided, answer the question below. Be sure to use complete sentences and justify your answer.

Suppose that gene b is sex-linked, recessive, and lethal. A man mates with a woman who is heterozygous for this gene. If this couple had many normal children, what would be the predicted ratio sex of these children?

# C. COLLEGE-LEVEL CRITICAL THINKING ASSIGNMENTS:

1. Case study: A 58-year-old woman comes to the clinic complaining of excessive sweating for the last few months. On questioning it seems that she often feels warm and flushed, even when others in the room are comfortable with the temperature. On further questioning she reveals a history of frequent stools, insomnia, and heart palpitations. She denies taking any medications or supplements, remembers no recent illnesses, and has never suffered these symptoms before. She has noticed, however, a painless lump in her neck that has been present at least since the symptoms started. Vital signs are: temperature 38.0 degrees C (100.4 degrees F), blood pressure 138/88 mmHg, pulse 121 per min, and respirations 20 per min. Examination reveals a thin woman with a bounding pulse and a slight resting tremor. Palpation of the thyroid reveals a palpable, nontender, half-centimeter nodule in the left lobe of the gland. Ocular and skin examinations are normal. Fine-needle aspiration of the nodule is performed, and, after review by a pathologist, reveals normal tissue. A thyroid function panel reveals:

TSH - 0.01 24 μU/L Thyroxine - 13.2 μg/dL

Answer the following questions on a separate sheet of paper.

What is the diagnosis of this patient? What are some possible etiologies for this patient? What organ systems are involved in the progression of this patient? What is cardiac palpitation? What is the mechanism involved in the heart palpitations? What is the painless lump in her neck called?

# 2. Physiology Case Study

Metabolic Syndrome - a Precursor to Type II Diabetes Mellitus

# Background

Metabolic Syndrome is a series of metabolic pathologies that precede the development of type II diabetes mellitus. The pathologies include hypertension (BP>130/85), hyperlipidemia (plasma TG>150 mg/dL, HDL100 mg/dL). Risk factors include: central obesity (a BMI of >30 and/or a waist circumference of >40 in. for men or >35 in. for women), family history of diabetes, inactivity, overeating, and aging.

## Case Study

Lou is a 57 year old man who is 5' 10" tall and weighs 220 lbs. He has a stressful, sedentary desk job during the week and usually feels too tired to do anything but watch TV on the weekend. He has recently noticed that he is often excessively thirsty, hungry, and urinates frequently. Lou mentions these things to his doctor, and his doctor orders some tests. The results of Lou's tests are:

Blood pressure - 150/88

Blood plasma triglycerides - 220 mg/dL (Normal triglyceride is \_\_\_\_\_) Total cholesterol - 217 mg/dL (Normal cholesterol is \_\_\_\_\_) -LDL 177 mg/dL (Normal LDL is \_\_\_\_\_) -HDL 30 mg/dL (Normal HDL is \_\_\_\_\_) Fasting blood glucose - 120 mg/dL (Normal FBG is \_\_\_\_\_) Waist circumference - 42 in. (Normal is \_\_\_\_\_)

Answer the following questions on a separate sheet of paper.

Calculate Lou's BMI

Is Lou's BMI considered normal or obese for his height and weight?

Why does Lou feel tired, hungry, and thirsty so much?

What may be the cardiovascular consequences of Lou's high triglyceride and cholesterol levels?

How does hyperinsulinemia lead to high triglyceride and cholesterol levels?

What may be the long term consequences of his high blood pressure? How does hyperlipidemia lead to high blood pressure?

Is it possible that Lou has metabolic syndrome?

If you were Lou's doctor, what would you tell him about the consequences of type II diabetes and what he needs to do to avoid developing the disorder?

# D. OTHER TYPICAL ASSESSMENT AND EVALUATION METHODS:

Performance exams Other exams

Quizzes

Reading reports

Written homework

Laboratory reports

**Class Performance** 

Homework Problems

**Multiple Choice** 

Completion

Matching Items

# **V. INSTRUCTIONAL METHODS**

Demonstration Discussion Laboratory Lecture Multimedia presentations Role Play Simulation

Note: In compliance with Board Policies 1600 and 3410, Title 5 California Code of Regulations, the Rehabilitation Act of 1973, and Sections 504 and 508 of the Americans with Disabilities Act, instruction delivery shall provide access, full inclusion, and effective communication for students with disabilities.

# **VI. WORK OUTSIDE OF CLASS**

Study Answer questions Required reading Problem solving activities Written work

# Estimated Independent Study Hours per Week: 4

# **VII. TEXTS AND MATERIALS**

# A. UP-TO-DATE REPRESENTATIVE TEXTBOOKS Cummings, Benjamin. <u>Human Anatomy and Physiology Laboratory Manual</u>. 10th ed. Marieb & Mitchell, 2012. Cummings, Benjamin. <u>Human Physiology: An Integrated Approach</u>. 5th ed. Silverthorn, 2010. Zao and Stabler. <u>Physio Ex 9.0 Laboratory Simulations in Physiology</u>. Cummings, Benjamin, 2012.

# B. ALTERNATIVE TEXTBOOKS

# C. REQUIRED SUPPLEMENTARY READINGS

# D. OTHER REQUIRED MATERIALS

# **VIII. CONDITIONS OF ENROLLMENT**

## A. Requisites (Course and Non-Course Prerequisites and Corequisites)

Sequential
Computational/Communication Skills
Computational/Communication Skills
Computational/Communication Skills

## B. Requisite Skills

#### **Requisite Skills**

Use scientific terminology. ANAT 32 -

Apply appropriate terminology such as directional terms and regional terms to various anatomical features.

Name and write chemical formulas for inorganic compounds: binary non-metals compounds, salts and acids. CHEM 4 -

Utilize the language of chemistry, including vocabulary, symbols, formulas, and equations. CHEM 20 -

Use chemical terminology to name inorganic chemical compounds, formulas and reactions and classify types of chemical reactions. Perform stoichiometric calculations involving chemical reactions.

Write and classify chemical equations for elementary chemical reactions. CHEM 4 -Utilize the language of chemistry, including vocabulary, symbols, formulas, and equations. CHEM 21A - Use the language of general chemistry (vocabulary, nomenclature, formulas and equations) to describe chemical systems and changes (physical and chemical) they undergo. Perform stoichiometric calculations involving chemical reactions. CHEM 21A - Use the language of general chemistry (vocabulary, nomenclature, formulas and equations) to describe chemical systems and changes (physical and chemical) they undergo.CHEM 4 -

Analyze and solve quantitative problems, including stoichiometry, percent yield, energy and change of temperature, gas laws, the ideal gas equation, Dalton's law of partial pressures, percent abundance of isotopes, density, solution concentration, and colligative properties.

Write acid-base reactions. CHEM 20 -

Compare and contrast Arrhenius and Bronsted-Lowry acid theories. Write acid-base reactions and determine the pH of aqueous solutions. Demonstrate an understanding of how a buffer works.

CHEM 21A - State the properties and definitions of acids and bases and interpret elementary acidbase equilibria.

Understand the basic structures and functional processes of the body systems. ANAT 32 - Identify cellular structures, organelles, and tissue types for all human organ systems. ANAT 32 -

Identify the major anatomical structures for the major organ systems of the human body including integumentary, musculoskeletal, nervous, endocrine, digestive, circulatory, respiratory, urinary, and reproductive systems.

# C. Recommended Preparations (Course and Non-Course)

Recommended Preparation	Category and Justification

# D. Recommended Skills

**Recommended Skills** 

# E. Enrollment Limitations

Enrollment Limitations and Category E	nrollment Limitations Impact
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Course created by Jim Rozolis, P. Mel on 04/01/1962.

# **BOARD APPROVAL DATE:**

LAST BOARD APPROVAL DATE:

Last Reviewed and/or Revised by Jessica Padilla on 09/13/2012

17612