



**I. GENERAL COURSE INFORMATION**

**Subject and Number:** Anatomy and Physiology 34A  
**Descriptive Title:** Anatomy and Physiology I  
**Course Disciplines:** Biological Sciences  
**Division:** Natural Sciences

**Catalog Description:**

This is the first semester of the two-semester Anatomy and Physiology lecture and lab course. It is an in-depth course examining major organ systems, their morphology and functions as well as some of their common pathologies. Topics include an introduction to the human body, chemical and biochemical principles, cell morphology and function, cell division, genetics and histology. In the first semester, the students study the integumentary, skeletal, and muscular systems, as well as the first half of the nervous system. Laboratory investigations include models of the human body and dissection of higher vertebrates, in addition to physiological experiments. The course is designed for science, health-related, pre-nursing (Bachelor of Science in Nursing), and pre-professional majors.

**Conditions of Enrollment:**

**Prerequisite:** Chemistry 4 or Chemistry 4H Chemistry 20 or Chemistry 21A or equivalent or concurrent enrollment

**Course Length:** X Full Term Other (Specify number of weeks):  
**Hours Lecture:** 3.00 hours per week TBA  
**Hours Laboratory:** 5.00 hours per week TBA  
**Course Units:** 4.00

**Grading Method:** Letter  
**Credit Status:** Associate Degree Credit

**Transfer CSU:** X Effective Date: 1/20/2009  
**Transfer UC:** X Effective Date: Fall 2009

**General Education:**

**El Camino College:**

**1 – Natural Sciences**

Term: Fall 2009 Other:

**CSU GE:**

**B2 - Life Science**

Term: Fall 2009 Other:

**B3 - Laboratory Sciences**

Term: Fall 2009 Other:

**IGETC:**

**5B - Biological Science with a Lab**

Term: Fall 2009 Other:

**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 be able to use language appropriate to anatomy and physiology and the health sciences.  
**Objective Exams**
2. Students will be able to use the compound microscope to observe cells, tissues, or microorganisms.  
**Objective Exams**
3. Students will be able to apply concepts learned to healthy and pathological outcomes.  
**Objective Exams**

**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. Demonstrate mastery of the microscope and be able to identify the cellular structures and tissues for all the systems covered.  
**Objective Exams**
2. Demonstrate an understanding of the interaction of chemical and physiological processes in cells and the body systems examined.  
**Objective Exams**
3. Identify all major anatomical structures in cells and tissues, as well as the integumentary, skeletal, muscular, and nervous systems.  
**Objective Exams**
4. Demonstrate an understanding of the physiological process and how they interact with the morphologies of the above systems.  
**Objective Exams**
5. Describe clinical disorders related to the topics discussed, as well as current treatments.  
**Clinical Evaluations**
6. Explain how the systems work together as a whole, and methods whereby the body maintains homeostasis.  
**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.)**

<b>Lecture or Lab</b>	<b>Approximate Hours</b>	<b>Topic Number</b>	<b>Major Topic</b>
Lecture	2	I	Introduction to the Human Body A. Body regions, quadrants, planes, sections, and cavities B. Surface anatomy and directional terms C. Levels of organization and clinical diagnostic methods D. Organ systems, including general functions and related organs E. General mechanisms for homeostasis including components of feedback loops

Lab	6	II	<p>Lab Activities</p> <p>A. SI system and computations lab</p> <ol style="list-style-type: none"> <li>Students will use the metric system to measure items, weigh materials, and use graduated cylinders to determine fluid volumes.</li> <li>Students will convert English measurements to metrics and convert between metric units.</li> <li>Students will use Scientific Method during a lab activity.</li> </ol> <p>B. Human models, cell models</p> <p>Students will examine human torso models and cell models to learn their structures and functions.</p>
Lecture	2	III	<p>Inorganic Chemistry</p> <p>A. Structure of the atom, isotopes, components of molecules, and chemical bonds</p> <p>B. Structure and properties of water</p>
Lab	4	IV	<p>Lab Activities</p> <p>Organic Model building lab</p> <p>Students will use "ball and stick" models to build organic molecules, including carbohydrates, lipids, proteins, and nucleic acids.</p>
Lecture	4	V	<p>Biochemistry</p> <p>A. Major biomolecules and their properties and sources, including biosynthesis and degradative reactions</p> <p>B. Properties and mechanics of biochemical reactions</p> <p>C. Formation of ATP via cellular respiration (aerobic/anaerobic)</p>
Lab	4	VI	<p>Lab Activities</p> <p>A. Organic molecules wet lab</p> <p>Students will perform chemical tests to determine the presence of monosaccharides, polysaccharides, proteins, and lipids.</p>
Lecture	4	VII	<p>Cell Structure and Function</p> <p>A. Description and function of each cell organelle</p> <p>B. Cellular processes: diffusion, facilitated diffusion, osmosis, active transport (primary/secondary), pinocytosis, phagocytosis, exocytosis</p> <p>C. Cell to cell communication processes and receptor types</p>
Lab	8	VIII	<p>Lab Activities</p> <p>A. Microscope Lab</p> <ol style="list-style-type: none"> <li>Students will learn proper microscope technique, and utilize the microscopes to examine slides.</li> <li>Students will learn how to make wet mount microscope slides.</li> <li>Students will discover the effect that the different magnification lenses have on the field of view and depth of view of the specimen.</li> <li>Students will examine cell models and cell slides.</li> </ol> <p>B. Cell transport wet lab</p> <p>Students will examine factors that affect transport across membranes, such as diffusion through gel and water, as well as osmosis through cell membranes and dialysis membranes.</p>

			C. Computer simulation on cell transport Students will use PhysioEx or similar computer program to examine other factors that affect cell transport, such as active transport versus passive transport processes.
Lecture	2	IX	Cell Division A. Phases of mitosis B. Phases of meiosis
Lab	4	X	Lab Activities Mitosis and meiosis models and slides A. Students will observe models and microscope slides, and draw the mitosis stages in a Whitefish blastula. B. Students will use pipe cleaners with colored beads to simulate the stages of mitosis and meiosis.
Lecture	4	XI	Genetics A. Structures of DNA and RNA B. Process of replication and protein synthesis
Lab	8	XII	Lab Activities A. Genetic heredity labs Students will use sticks to represent common monogenetic genotypes, simulate genetic recombination during fertilization, then determine the phenotypes of the resulting offspring. B. Genetic problems Students will solve genetic problems, such as autosomal dominant, autosomal recessive, sex-linked, codominant, complete dominance, incomplete dominance, and multiple alleles.
Lecture	6	XIII	Histology A. Basic histological tissues (epithelial, connective, muscular, and nervous) and their characteristics, functions, and locations B. Utilize the light microscope to view specimens and demonstrate proper microscope care.
Lab	6	XIV	Lab Activities Tissue slides and models Students will examine and draw basic histological tissues (epithelial, connective, muscular, and nervous) and describe their characteristics, functions, and locations.
Lecture	4	XV	Integumentary System A. Components and specific functions of the integument and accessory structures B. Functions of integument structures with other organ systems C. Homeostatic mechanisms related to integumentary system D. Explain why the histology of the epidermis is well suited for its function E. Describe the benefits of skin being a multilayer organ F. Explain the changes in skin structure and function that occur with aging

Lab	4	XVI	<p>Lab Activities</p> <p>Students will examine skin models and observe microscopic sections of skin slides, drawing and labeling the slides. Fingerprints will be taken and compared to common print patterns. Sweat gland density in different body areas will be compared.</p>
Lecture	6	XVII	<p>Skeletal System</p> <ol style="list-style-type: none"> <li>A. Bones, including landmarks and functions</li> <li>B. Joint classifications, features and functions</li> <li>C. Function of osteoblasts and osteoclasts during bone growth, repair, and remodeling. Include endochondral and intramembranous ossification</li> <li>D. Hormonal regulation of osteogenic processes</li> <li>E. Contrast the remodeling/growth processes of a child (birth to adolescence) and adult (middle to old age)</li> </ol>
Lab	12	XVIII	<p>Lab Activities</p> <ol style="list-style-type: none"> <li>A. Bone tissue slides and models of bones and joints will be drawn and labeled.</li> <li>B. Human skeletons (articulated and disarticulated) will be examined and their component parts will be learned. A human skeleton will be constructed.</li> </ol>
Lecture	7	XIX	<p>Muscular System</p> <ol style="list-style-type: none"> <li>A. Major skeletal muscles of the human body including flexors and extensors of the neck, thorax, hip, knee, ankle, shoulder, elbow, and wrist</li> <li>B. Describe the terms: prime mover (agonist), antagonist, synergist and fixator</li> <li>C. Muscle contractions</li> <li>D. Histological structures of all three muscle types</li> <li>E. Neuromuscular junction anatomy</li> <li>F. Nature of a simple muscle twitch, summation, tetanus, and fatigue</li> <li>G. Properties of isotonic contractions, isometric contractions, and work</li> </ol>
Lab	16	XX	<p>Lab Activities</p> <ol style="list-style-type: none"> <li>A. Major skeletal muscles of a cat or other mammal will be dissected and identified.</li> <li>B. Classroom models of all major muscles will be examined and the muscle locations, origins, insertions, and actions will be learned.</li> <li>C. Computer simulation on animal muscle physiology (e.g., PhysioEx or similar program) will be performed by students to examine a muscle twitch, motor unit recruitment, treppe, wave summation, incomplete tetanus, complete tetanus, isotonic and isometric contractions.</li> <li>D. Computer-assisted lab on human muscle physiology (e.g., BioPac or similar program) will be performed to experience external muscle stimulation and its effects.</li> </ol>
Lecture	5	XXI	Nervous System Introduction

			<ul style="list-style-type: none"> <li>A. Adult derivatives of the nervous system and the embryological region of origin</li> <li>B. Function and structure of the central, peripheral, and autonomic divisions of the nervous system</li> <li>C. Structure and function of neurons and glial cells</li> <li>D. Neurotransmitter classification the release at the synaptic cleft</li> <li>E. Neuronal signaling including the effects of electrical and chemical gradients and potentials</li> <li>F. Types of potentials and conduction</li> </ul>
Lab	6	XXII	<p>Lab Activities</p> <ul style="list-style-type: none"> <li>A. Computer simulation on neurophysiology (e.g., PhysioEx or similar program) will be used to illustrate the effects of ions, such as sodium, potassium, and calcium in generating graded potentials, action potentials, depolarization, repolarization, hyperpolarization, and synaptic transmission. Neurotoxin effects will also be observed.</li> <li>B. Microscope slides of neurons and anatomic models of neurons and synapse will be examined, drawn and labeled.</li> </ul>
Lecture	4	XXIII	<p>Central Nervous System</p> <ul style="list-style-type: none"> <li>A. Parts of the central nervous system, including the functions and organization of the brain and spinal cord</li> <li>B. Structural basis for, and the importance of the protective layers in the central nervous system</li> <li>C. Five lobes of the cerebral cortex and describe how the motor and sensory functions of the cerebrum are distributed among the lobes</li> <li>D. Relationship between sensory and motor homunculi and body function</li> <li>E. Intellectual processes such as memory and consciousness.</li> <li>F. Explain sleep, wakefulness, circadian rhythms, behavior patterns, and psychosomatic reaction</li> </ul>
Lab	6	XXIV	<p>Lab Activities</p> <ul style="list-style-type: none"> <li>A. Dissection of the major features of a sheep or other mammalian brain will be examined by students.</li> <li>B. Anatomical models of human brains and slides of the human nervous system, such as spinal cord cross sections, will be viewed and their major structures drawn and labeled.</li> </ul>
Lecture	4	XXV	<p>Peripheral Nervous System</p> <ul style="list-style-type: none"> <li>A. Branches of the peripheral nervous system and major nerve plexi</li> <li>B. Reflex responses in terms of the major structural and functional components of a reflex arc, include structure and functional classification of reflex arcs</li> <li>C. Functions of each of the cranial nerves and also indicate if each is a sensory, motor, or mixed nerve</li> <li>D. Ascending and descending tracts in the spinal cord</li> <li>E. Location and function of neurons in sensory and motor pathways, including decussation pathways</li> </ul>

Lab	6	XXVI	Lab Activities A. Reflex labs and cranial nerve assessment labs 1. Reflexes tested will include the patellar, achilles, pupillary, cilliospinal, crossed extensor, and salivary. 2. All twelve cranial nerves will be tested. B. Anatomic Models of cranial nerves will be examined.
<b>Total Lecture Hours</b>	54		
<b>Total Laboratory Hours</b>	90		
<b>Total Hours</b>	144		

#### 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:

Problem solving Demonstration:

Answer the following questions on a separate sheet of paper using complete sentences. A 5 year-old boy develops a headache, cough, myalgia, and a fever. He has been a healthy child with all immunizations up to date. He is given a decongestant and an aspirin for his symptoms with some relief. However, 4 days later, he is brought back by his parents because of persistent vomiting and irritability. On physical examination, he is found to be semicomatose, becoming combative on stimulation. What is the diagnosis of this patient? What organ systems are involved in the progression of this patient? What are the possible causes of this disease?

##### C. COLLEGE-LEVEL CRITICAL THINKING ASSIGNMENTS:

Answer the following questions on a separate sheet of paper using complete sentences.

A 72 year-old man has had "out of control" behavior in the past few weeks. He has always been known as a good role model for his children and grandchildren, but lately he has started cursing and passing flatus loudly in front of others. His mood changes suddenly, bursting easily into laughter and tears without an apparent cause. At family meals he grabs food from his plate and the table and shoves it in his mouth as if somebody was about to take it from him. Comments from family members regarding his behavior do not seem to help. Brain studies show irreversible changes with prominent frontotemporal atrophy.

Describe some characteristics of "out of control" behavior besides the ones stated above in the clinical case for a 72 year old patient.

What could be some causes for this sudden change in personality?

Would this behavior change be normal or abnormal in elderly patients? Why or why not?

What is atrophy?

What are some long term effects of this disease?

What is the prognosis for this disease?

An irreversible dementia with early personality and behavioral changes in the absence of significant cognitive impairment is characteristically seen in which of the disorders?

- A. Alzheimer-type dementia
- B. Cotard syndrome
- C. Dementia pugilistica
- D. Ganser syndrome
- E. Pick dementia

Answer the following questions on a separate sheet of paper using complete sentences-

A 53 year-old woman comes to the physician because of concerns regarding menopause. She has a period almost every month, but her cycle is lengthening. She is worried because her mother, her two older sisters, and practically all her aunts have osteoporosis. She does not want to be on estrogen because she is concerned about cancer and thrombosis. Physical examination is within normal limits. Alendronate is prescribed but at follow up visit she says that she stopped taking it because of esophageal irritation. The patient is now started on raloxifene.

What is mechanism of action of estrogen on bone?

What other hormones should be monitored in this patient and why?

Why should this patient be concerned about osteoporosis besides the family history of it?

What is the esophageal irritation considered in this patient?

On this medication, which of the following is this patient most likely to develop?

- A. Breast cancer
- B. Elevated cholesterol
- C. Endometrial hyperplasia
- D. Hot flashes
- E. Osteoporosis

#### **D. OTHER TYPICAL ASSESSMENT AND EVALUATION METHODS:**

Essay exams

Objective Exams

Other exams

Quizzes

Written homework

Laboratory reports

Class Performance

Homework Problems

Multiple Choice

Completion

Matching Items

True/False

Other (specify):

short answer, essay, and laboratory practica

Clinical Evaluations

#### **V. INSTRUCTIONAL METHODS**

Demonstration

Discussion

Group Activities

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  
Skill practice  
Required reading  
Problem solving activities  
Written work

**Estimated Independent Study Hours per Week: 6**

## VII. TEXTS AND MATERIALS

### A. UP-TO-DATE REPRESENTATIVE TEXTBOOKS

McKinley, O'Laughlin, and Bidel. *Anatomy and Physiology: An Integrated Approach*, 3<sup>rd</sup> ed. McGraw-Hill Publishing, 2019.

Marieb and Smith. *Human Anatomy & Physiology Laboratory Manual, cat version with PhysioEx CD - ROM*. 13<sup>th</sup> ed. Pearson Benjamin Cummings, 2019.

### B. ALTERNATIVE TEXTBOOKS

### C. REQUIRED SUPPLEMENTARY READINGS

### D. OTHER REQUIRED MATERIALS

Separate anatomy text and physiology text, or a two-semester combined anatomy and physiology textbook are acceptable, as noted under Required Texts above.

Biopac kits

## VIII. CONDITIONS OF ENROLLMENT

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

Requisites	Category and Justification
Course Prerequisite Chemistry-4 or	
Course Prerequisite Chemistry-4H	
Course Prerequisite Chemistry-20 or	
Course Prerequisite Chemistry-21A or	
Non-Course Prerequisite	<p>The physiology portion of this Anatomy and Physiology course requires the knowledge and use of basic chemistry skills. The skills needed include knowledge of acids and bases, pH, oxidation-reduction reactions, chemical bonding, properties of water and chemical equilibrium. Without this knowledge, students are unlikely to understand the concepts of cellular respiration and other cellular reactions, homeostasis and blood chemistry and electrolytes.</p> <p>These skills can be obtained prior to or during the course of the semester, which is why the chemistry course can be</p>

	completed prior to the beginning of the class, or be taken concurrently with the Anatomy and Physiology 34A class. More chemistry is required in the Anatomy and Physiology 34B course in the second semester. Further, most health programs, for which these classes are a prerequisite, require that chemistry be completed as part of their requirements for enrollment.
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**B. Requisite Skills**

<b>Requisite Skills</b>
Use scientific terminology
Name and write chemical formulas for inorganic compounds: binary non-metal compounds, salts, and acids
Write and classify chemical equations for elementary chemical reactions
Perform stoichiometric calculations involving chemical reactions
Write acid-base reactions
Understand the basic structural and functional processes of the body systems

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

<b>Recommended Preparation</b>	<b>Category and Justification</b>

**D. Recommended Skills**

<b>Recommended Skills</b>

**E. Enrollment Limitations**

<b>Enrollment Limitations and Category</b>	<b>Enrollment Limitations Impact</b>

Course created by Thanh Thuy Bui, Jessica Padilla, Margaret Steinberg, Simon Trench on 10/26/2016.

BOARD APPROVAL DATE: 01/20/2009

LAST BOARD APPROVAL DATE: 01/22/2019

Last Reviewed and/or Revised by: Jessica Padilla, Margaret Steinberg, and Than-Thuy Bui. Date: 10/14/2018

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