

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

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. Use appropriate terminology in discussing anatomical and physiological principles and relationships pertaining to the course subject matter.

Laboratory reports

2. Identify all major anatomical structures of the special senses, endocrine, cardiovascular, lymphatic, respiratory, digestive, urinary, reproductive, and autonomic nervous systems.

Objective Exams

3. Explain the physiological functions and processes, and how they relate to their morphology for the above systems.

Written homework

4. Describe clinical disorders related to the topics discussed, as well as current treatments.

Clinical Evaluations

5. 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.)

Lecture or Lab	Approximate Hours	Topic Number	Major Topic
Lecture	4	I	Special Senses A. Gross and microscopic anatomy of the eye and ear B. Specific tissues of the eye function in vision C. Characteristics of visual acuity, accommodation, peripheral vision, color vision, and near point of accommodation D. Specific tissues of the ear involved in hearing and equilibrium E. Common abnormalities that may occur in vision and hearing

			<p>F. Olfactory receptors and their role in smell</p> <p>G. Gustatory receptors and their role in taste</p>
Lab	6	II	<p>Lab Activity: Anatomy and Physiology of the Eye</p> <p>A. Cow eye dissection</p> <p>B. Model of human eye</p> <p>C. Microscope slides of eye</p> <p>D. Visual tests and experiments</p>
Lecture	4	III	<p>Autonomic Nervous System</p> <p>A. General characteristics of the autonomic nervous system</p> <p>B. Sympathetic and parasympathetic subdivisions of the ANS, anatomy and functions</p> <p>C. Neurotransmitters secreted by the subdivisions of the ANS, and the different types of receptors for those neurotransmitters</p> <p>D. Factors that regulate ANS functions</p>
Lab	6	IV	<p>Lab Activity: Anatomy & Physiology of the Ear: Hearing and Equilibrium</p> <p>A. Models of human ear</p> <p>B. Microscope slides of ear structures</p> <p>C. Hearing and equilibrium tests and experiments</p>
Lecture	5	V	<p>Endocrine System</p> <p>A. General functions of the endocrine system</p> <p>B. Gross and microscopic anatomy of endocrine glands and tissues</p> <p>C. Chemical classifications of hormones</p> <p>D. Mechanisms of hormone actions at their effectors</p> <p>E. Functions and the inter-relationships of the hypothalamus and the pituitary gland</p> <p>F. Actions of the pituitary gland in the regulation of other endocrine glands in the body</p> <p>G. Actions of other endocrine glands, such as the adrenals, thyroid, parathyroids, pancreas, gonads, and pineal gland, including the effects of their hypo- and hypersecretion of hormones</p> <p>H. Function of hormones secreted by other endocrine tissues and cells, such as erythropoietin, thymosin, digestive hormones, placental hormones, atrial natriuretic peptide, vitamin D, eicosanoids, and growth factors</p> <p>I. Hormonal response to stress</p>
Lab	6	VI	<p>Lab Activity: Endocrine</p> <p>A. Dissection of cat (or other mammal) endocrine structures</p> <p>B. Human model endocrine gland identification</p> <p>C. Microscope slides of endocrine tissues</p> <p>D. Computer simulation of endocrine physiology (e.g. PhysioEX)</p>
Lecture	6	VII	<p>Cardiovascular System - Blood</p> <p>A. General functions of the cardiovascular system</p> <p>B. Composition of blood plasma</p>

			<ul style="list-style-type: none"> C. Microscopic anatomy, numbers, formation, and functional roles of the formed elements of the blood D. Types of blood tests (blood differentials) and their significance in clinical practice E. Hemostasis, and how blood coagulation occurs F. ABO and Rh blood grouping and their significance in clinical practice
Lecture	4	VIII	<p>Cardiovascular System – Blood Vessels, Blood Pressure</p> <ul style="list-style-type: none"> A. Anatomy and functional roles of the different types of blood vessels (arteries, arterioles, capillaries, venules, veins) B. Major arteries and veins in the mammalian cardiovascular system C. Patterns of blood circulation through the body, including the systemic, pulmonary, coronary, hepatic portal, and fetal circulations D. Blood pressure and its functional interrelationships with cardiac output, peripheral resistance, and hemodynamics E. Pathologies of the cardiovascular system, their diagnoses and treatments
Lab	9	IX	<p>Lab Activity: Cardiovascular - Heart</p> <ul style="list-style-type: none"> A. Sheep heart (or other mammal) dissection B. Human heart models C. Computer assisted electrocardiography experiments (e.g. Biopac 4.1) D. Computer simulation of frog cardiovascular physiology (e.g. PhysioEx 9.1)
Lab	9	X	<p>Lab Activity: Cardiovascular - Blood vessels</p> <ul style="list-style-type: none"> A. Dissection of major cat (or other mammal) arteries and veins B. Human model blood vessel identification C. Blood pressure and pulse experiments D. Computer simulation of cardiovascular dynamics (e.g. PhysioEx 9.1)
Lecture	4	XI	<p>Lymphatic System and Immunity</p> <ul style="list-style-type: none"> A. General functions of the lymphatic system B. Gross and microscopic anatomy of lymphatic organs and tissues C. General pattern of lymphatic circulation D. Mechanisms of lymph formation and flow E. Non-specific resistance to disease and the inflammatory response F. Cell-mediated immune response G. Roles of B and T cells in immune response H. Pathologies of the lymphatic system, their diagnoses and treatments
Lab	6	XII	<p>Lab Activity: Cardiovascular - Blood</p> <ul style="list-style-type: none"> A. Microscope slides of human blood B. Simulated blood experiments (e.g. blood typing and count)

			C. Computer simulation of blood analysis (e.g. PhysioEx 9.1)
Lecture	5	XIII	<p>Respiratory System</p> <ul style="list-style-type: none"> A. General functions of the respiratory system B. Gross and microscopic anatomy of the respiratory tract and related organs C. Mechanisms of pulmonary ventilation D. Types of respiratory volumes, their normal capacities, and modifications of the respiratory cycle E. Mechanisms of gas exchange in the lungs and in tissues F. Mechanisms of gas transport in the blood G. Factors that control pulmonary ventilation H. Respiratory pathologies, their diagnoses and treatments
Lab	10	XIV	<p>Lab Activity: Respiratory Anatomy & Physiology</p> <ul style="list-style-type: none"> A. Dissection of cat respiratory structures B. Human respiratory models ID C. Microscope slides of respiratory organs D. Computer assisted respiratory volumes and capacity measurements (e.g. PhysioEx 9.1) E. Computer simulation of respiratory system mechanics (e.g. PhysioEx 9.1)
Lecture	5	XV	<p>Digestive System</p> <ul style="list-style-type: none"> A. General functions and processes of the digestive system B. Gross and microscopic anatomy of the GI tract and accessory organs of digestion C. Mechanical and chemical processes of digestion and absorption D. Processes of excretion and elimination E. Hormonal and neural regulation of digestive processes F. Homeostatic integration of the digestive system with other body systems G. Digestive pathologies, their diagnoses and treatments H. Major enzyme names and functions involved in digestion. I. Three (3) phases of digestion and its event in Cephalic, Gastric, and Intestinal Phase.
Lab	15	XVI	<p>Lab Activity: Digestive Anatomy and Physiology</p> <ul style="list-style-type: none"> A. Dissection of cat (or other mammal) digestive viscera B. Human model digestive organ ID C. Microscope slides of digestive organs and tissues D. Wet lab or computer simulation of digestive physiology (e.g. PhysioEx 9.1)
Lecture	3	XVII	<p>Nutrition & Metabolism</p> <ul style="list-style-type: none"> A. General overview of the six (6) nutrients and recommendations B. Hormonal and neural regulations of metabolism, appetite and satiety C. Brief review of the composition of the four major biomolecules in food (i.e., carbohydrates, lipids, proteins, and nucleic acids), their monomers and polymers, their food sources and energy contents, Process of cellular respiration

			<ul style="list-style-type: none"> D. Catabolism and anabolism of carbohydrates, lipids, and proteins E. The events in post-absorptive (starvation) and absorptive (fed) states F. Metabolic roles of specific tissues and organs, including the liver, adipose tissue, and skeletal muscle G. Concepts of energy balance, metabolic rate, and thermoregulation H. Metabolic pathologies, their diagnoses and treatments
Lecture	5	XVIII	<p>Urinary System</p> <ul style="list-style-type: none"> A. General functions of the urinary system B. Gross and microscopic anatomy of the kidney and other urinary structures, including a detailed histology of a nephron C. Functional processes of urine formation, including filtration, reabsorption, secretion, and excretion D. Factors regulating and altering urine volume and composition, including the renin-angiotensin system and the roles of aldosterone and antidiuretic hormone E. Endocrine activities of the kidneys, such as vitamin D activation and the secretion of erythropoietin F. Innervation and control of the urinary bladder G. Urinary pathologies, their diagnoses and treatments
Lab	10	XIX	<p>Lab Activity: Urinary Anatomy & Physiology</p> <ul style="list-style-type: none"> A. Dissection of cat (or other mammal) urinary structures B. Dissection of injected kidney C. Human model urinary structure ID D. Microscope slides of urinary organs E. Urinalysis experiments (wet lab) F. Computer simulation renal system physiology
Lecture	3	XX	<p>Fluid, Electrolyte, and Acid-base Balance</p> <ul style="list-style-type: none"> A. Regulation of water intake and output B. Major body fluid compartments, including intracellular, extracellular, intravascular, and interstitial areas C. Volume and chemical composition of the major compartment fluids D. Major electrolytes involved in regulating fluid balance, and their roles in the body E. Major buffer systems and their roles in maintaining acid-base balance F. Roles of the respiratory and urinary systems in maintaining acidbase balance G. Causes of blood acidosis and alkalosis
Lab	5	XXI	<p>Lab Activity: Acid-Base Balance</p> <p>Computer simulation of acid-base balance (e.g. PhysioEx 9.1)</p>
Lecture	4	XXII	<p>Reproductive System</p> <ul style="list-style-type: none"> A. General functions of the male and female reproductive systems B. Gross and microscopic anatomy of female and male reproductive tracts and external genitalia

			<ul style="list-style-type: none"> C. Reproductive cell division (meiosis, oogenesis, and spermatogenesis) D. Specific roles of the ovaries, uterine tubes, uterus, vagina and mammary glands in female reproduction E. Uterine and ovarian cycles, including the hormones involved in each cycle F. Specific roles of the testes, epididymis, ductus deferens, seminal vesicles, prostate, bulbourethral glands, and urethra in male reproduction
Lab	6	XXIII	Lab Activity: Reproductive Anatomy <ul style="list-style-type: none"> A. Dissection of cat reproductive (or other mammal) structures B. Male and female reproductive model ID
Lecture	2	XXIV	Embryology and Development <ul style="list-style-type: none"> A. Regulation of reproductive functions, including puberty, the female reproductive cycle, and the climacteric B. Development of the embryo/fetus and the hormonal changes during pregnancy, parturition, and labor C. How sex determination occurs, including the genes involved D. Reproductive pathologies
Lab	2	XXV	Lab Activity: Embryology Identification of embryo development models, and cat embryos and fetuses (if available)
Total Lecture Hours		54	
Total Laboratory Hours		90	
Total Hours		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:

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, HDL 100 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 yr. 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 (Normal BP is _____) 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 – 110 mg/dl (Normal FBG is _____) Waist circumference – _____

42 in. (Normal is _____)

Answer the following questions on a separate sheet of paper using complete sentences. 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 consequences of type II diabetes and what he needs to do to avoid developing the disorder?

C. COLLEGE-LEVEL CRITICAL THINKING ASSIGNMENTS:

1. Concept Mapping

On a separate sheet of paper, draw a concept map that illustrates the roles of the 11 body systems and their interactions in maintaining water balance in the body.

2. Iron Deficiency Anemia Case Study

Dolores Welborn is a 28-year-old attorney living in Portland, Oregon. Dolores is in the second trimester of pregnancy with her first child, and though her pregnancy had been progressing normally, recently she has noticed that she tires very easily and is short of breath from even the slightest exertion. She also has experienced periods of light-headedness, though not to the point of fainting. Other changes she has noticed are cramping in her legs, a desire to crunch on ice, and the fact that her tongue is sore. She doubts that all of these symptoms are related to one another, but she is concerned, and she makes an appointment to see her physician. Upon examining Dolores, her physician finds that she has tachycardia, pale gums and nail beds, and her tongue is swollen. Given her history and the findings on her physical exam, the physician suspects that Dolores is anemic and orders a sample of her blood for examination. The results are shown below: Table 1. Blood Sample Results Red Blood Cell Count 3.5 million/mm³ Hemoglobin (Hb) 7 g/dl Hematocrit (Hct) 30% Serum Iron low Mean Corpuscular Volume (MCV) low Mean Corpuscular Hb Concentration (MCHC) low Total Iron Binding Capacity in the Blood (TIBC) high Questions: Please answer on a separate sheet of paper, using complete sentences. 1. Describe the structure of a molecule of hemoglobin and explain the role played by iron in the transport of oxygen. 2. How is iron stored and transported in the body? 3. What are the normal levels of the substances listed in the blood test above for a woman of Dolores' age? RBC count: _____; Hb: _____; Hct: _____; Serum iron: _____; MCV: _____; MCHC: _____; TIBC: _____ 4. What is your diagnosis of Dolores' condition? 5. What is Iron Deficiency Anemia (IDA) and how frequently does it occur? 6. What are the most common causes of IDA? 7. Why are women more prone to IDA than men? 8. What are the red blood cell indices, and what tests are diagnostic for IDA? 9. How is IDA treated and prevented?

D. OTHER TYPICAL ASSESSMENT AND EVALUATION METHODS:

- Essay 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

V. INSTRUCTIONAL METHODS

Demonstration
Discussion
Group Activities
Laboratory
Lecture
Multimedia presentations
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
Other:
 Online practice assignments (e.g. CONNECT)
 Completion of Computer simulated labs (e.g. PhysioEx 9.1)

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*, 3rd ed. McGraw-Hill Publishing, 2019.

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

B. ALTERNATIVE TEXTBOOKS

C. REQUIRED SUPPLEMENTARY READINGS

D. OTHER REQUIRED MATERIALS

Biopac kit
Biopac 4.1 biometric tools and data analysis program
PhysioEx 9.1 Lab Simulation Manual and program

VIII. CONDITIONS OF ENROLLMENT

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

Requisites	Category and Justification
Course Prerequisite Anatomy and Physiology-34A	Sequential

B. Requisite Skills

Requisite Skills
Demonstrate mastery of the microscope and be able to identify the cellular structures and tissues for all the systems covered. APHY 34A - Demonstrate mastery of the microscope and be able to identify the cellular structures and tissues for all the systems covered.
Demonstrate an understanding of the interaction of chemical and physiological processes in cells and the body systems examined. APHY 34A - Demonstrate an understanding of the interaction of chemical and physiological processes in cells and the body systems examined.
Identify all major anatomical structures in cells and tissues, as well as the integumentary, skeletal, muscular, and nervous systems. APHY 34A - Identify all major anatomical structures in cells and tissues, as well as the integumentary, skeletal, muscular, and nervous systems.
Demonstrate an understanding of the physiological process and how they interact with the morphologies of the above systems. APHY 34A - Demonstrate an understanding of the physiological process and how they interact with the morphologies of the above systems.
Describe clinical disorders related to the topics discussed, as well as current treatments. APHY 34A - Describe clinical disorders related to the topics discussed, as well as current treatments.
Explain how the systems work together as a whole, and methods whereby the body maintains homeostasis. APHY 34A - Explain how the systems work together as a whole, and methods whereby the body maintains homeostasis.

C. Recommended Preparations (Course and Non-Course)

Recommended Preparation	Category and Justification
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D. Recommended Skills

Recommended Skills

E. Enrollment Limitations

Enrollment Limitations and Category	Enrollment Limitations Impact
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Course created by Thanh Thuy Bui, Jessica Padilla, Margaret Steinberg, Simon Trench on 11/01/2008.

BOARD APPROVAL DATE: 01/20/2009

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

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