



COURSE OUTLINE : BIOL 121 D
Credit – Degree Applicable
COURSE ID 005080
Cyclical Review: September 2020

COURSE DISCIPLINE : BIOL

COURSE NUMBER : 121

COURSE TITLE (FULL) : Introduction to Physiology

COURSE TITLE (SHORT) : Intro to Physiology

CALIFORNIA STATE UNIVERSITY SYSTEM C-ID : BIOL 120 B - Human Physiology with Lab

CATALOG DESCRIPTION

BIOL 121 covers the functions, homeostasis, and integration of the organ systems of the human body. The organ systems studied include: integumentary, nervous, sensory, bone, muscle, endocrine, blood, lymphatic, and immune, cardiovascular, respiratory, urinary, digestive, and reproductive systems. Laboratory activities include using the scientific method to predict experimental outcomes, acquire data, analyze it and draw conclusions, and apply concepts learned in both lecture and the laboratory to clinical pathophysiological scenarios. This course is primarily intended for Nursing, Kinesiology, and other health related majors.

Total Lecture Units:3.00

Total Laboratory Units: 1.00

Total Course Units: 4.00

Total Lecture Hours:54.00

Total Laboratory Hours: 54.00

Total Laboratory Hours To Be Arranged:0.00

Total Contact Hours: 108.00

Total Out-of-Class Hours: 108.00

Prerequisite: BIOL 120 and one of the following: CHEM 101, 110, or 120.



ENTRY STANDARDS

	Subject	Number	Title	Description	Include
1	BIOL	120	Human Anatomy	Identify major structures in the 11 systems of the human body;	Yes
2	BIOL	120	Human Anatomy	identify the basic features of cells and their organization as tissues;	Yes
3	BIOL	120	Human Anatomy	identify the four major tissue types;	Yes
4	BIOL	120	Human Anatomy	identify subtypes of tissues within each major tissue type (e.g., areolar connective tissue, cardiac muscle, simple vs. stratified epithelium);	Yes
5	BIOL	120	Human Anatomy	identify the location and function of subtypes of tissues in various organ systems;	Yes
6	BIOL	120	Human Anatomy	describe the structure-function relationship of each organ system (e.g., the nephron and its role in the kidney);	Yes
7	BIOL	120	Human Anatomy	demonstrate proper use of a microscope to identify major tissue types in histological slides;	Yes
8	BIOL	120	Human Anatomy	identify all major bones and bone markings using human bones and models;	Yes
9	BIOL	120	Human Anatomy	identify all major muscles (including knowledge of origin, insertion, and action) using anatomical models;	Yes
10	BIOL	120	Human Anatomy	identify all of the major structures of organ systems using models and tissue slides;	Yes
11	BIOL	120	Human Anatomy	identify major organs and structures in a human cadaver;	Yes
12	BIOL	120	Human Anatomy	demonstrate proper dissection techniques for organs (e.g., cow eye, sheep brain).	Yes
13	CHEM	101	General Chemistry	evaluate past and present atomic theories with respect to experimental observations	No
14	CHEM	101	General Chemistry	describe chemical processes in terms of chemical equations and be able to use the equations to answer quantitative questions concerning the process described	Yes
15	CHEM	101	General Chemistry	describe the relationship between matter and energy and the inter-conversion of the two	Yes
16	CHEM	101	General Chemistry	analyze modern theories of atomic motion, especially as they apply to gasses	Yes



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17	CHEM	101	General Chemistry	use quantum theory to predict electronic structures of the atom	No
18	CHEM	101	General Chemistry	analyze the properties of the elements and develop algorithms for the classification of the elements into logical groups	No
19	CHEM	101	General Chemistry	utilize bonding theories to describe the chemical nature of ions and molecules	Yes
20	CHEM	101	General Chemistry	demonstrate the proper use of laboratory equipment and the ability to handle chemicals safely	Yes
21	CHEM	101	General Chemistry	describe the scientific method and apply it to the development of the science of chemistry	Yes
22	CHEM	101	General Chemistry	demonstrate an understanding of intermolecular forces and apply those forces to the nature of solids and liquids	Yes
23	CHEM	110	Elements Of General Chemistry	evaluate current atomic theories;	Yes
24	CHEM	110	Elements Of General Chemistry	analyze experimental data;	Yes
25	CHEM	110	Elements Of General Chemistry	predict chemical properties;	Yes
26	CHEM	110	Elements Of General Chemistry	demonstrate proper use of laboratory equipment and chemicals.	Yes
27	CHEM	120	Fundamentals Of College Chemistry (Inorganic)	use the dimensional analysis method of problem solving	Yes
28	CHEM	120	Fundamentals Of College Chemistry (Inorganic)	analyze supposed scientific reasoning as logical or not	Yes
29	CHEM	120	Fundamentals Of College Chemistry (Inorganic)	evaluate scientific statements and develop an opinion as to their validity	Yes
30	CHEM	120	Fundamentals Of College Chemistry (Inorganic)	know and understand basic chemical data, rules, and laws.	Yes



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EXIT STANDARDS

- 1 Describe the chemistry and biology of macromolecules important to homeostatic physiology;
- 2 identify cellular structures and their functions;
- 3 describe aspects of bioenergetics and metabolism important to homeostatic physiology;
- 4 describe the mechanics of gene expression, genetic inheritance, and selected genetic disorders;
- 5 identify the role of enzymes in energy production and disease processes;
- 6 describe cell transport and communication mechanisms and their role in disease processes;
- 7 describe the relationship between structure and function in the human nervous system, and its disorders;
- 8 describe the relationship between structure and function of sensory systems in the human body;
- 9 identify human hormone functions, mechanisms of action, and endocrine disorders;
- 10 describe the relationship between structure and function in the human musculoskeletal system;
- 11 describe the properties of human blood and lymphatic systems, as well as immune system function and its disorders;
- 12 describe the relationship between structure and function of the human cardiovascular system, and its disorders;
- 13 describe the relationship between structure and function of the human respiratory system, and its disorders;
- 14 describe the relationship between structure and function of the human urinary system, and its disorders;
- 15 describe the relationship between structure and function of the human digestive system, and its disorders;
- 16 describe the relationship between structure and function of the human reproductive system, and its disorders.

STUDENT LEARNING OUTCOMES

- 1 explain the role of biochemical mechanisms in the normal physiology of the human body systems, as well as in selected pathophysiological conditions;
- 2 demonstrate an understanding of the scientific method by predicting experimental outcomes, carrying out physiological experiments, and applying this information to the physiological and pathophysiological principles of the human body.

COURSE CONTENT WITH INSTRUCTIONAL HOURS

	Description	Lecture	Lab	Total Hours
1	Cell Structures and Functions	1.5	0	1.5
2	The Scientific Method and the Metric System	0	3	3
3	Important Biological Molecules <ul style="list-style-type: none">• The role of acids, bases and salts• The role of organic compounds• Chemical reactions	1.5	0	1.5



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4	Genetic Control of the Cell <ul style="list-style-type: none"> • DNA structure and replication • Transcription • Protein synthesis • Restriction enzyme DNA fingerprinting • Clinical manifestations of genetic disorders 	6.5	6	12.5
5	Cell Division <ul style="list-style-type: none"> • The cell cycle • Mitosis and meiosis • Spermatogenesis and oogenesis 	1.5	3	4.5
6	Cell Respiration and Metabolism <ul style="list-style-type: none"> • Enzymes • Biochemical pathways of energy production • Diagnostic value of plasma enzymes to detect disease • Analysis of factors affecting enzyme function 	3	3	6
7	Cell Membrane Transport Mechanisms <ul style="list-style-type: none"> • Diffusion and Osmosis • Solutions • Carrier-mediated transport • Bulk Transport • Cell junctions and cell to cell communication • Fluid compartments 	4	3	7
8	Tissues, Organs, and Organ systems	1	0	1
9	The Integumentary System	1	0	1
10	The Nervous System <ul style="list-style-type: none"> • Neurons and neuroglia cells • Membrane potentials • Action and graded potential • Conduction of nerve impulses • Synapses and neurotransmitters • The central nervous system • The autonomic nervous system • Clinical implications of neurodegenerative diseases • Clinical reflex testing to understand neuropathology 	6	4	10
11	Sensory System <ul style="list-style-type: none"> • Sensory receptors • Cutaneous sensations • Taste and olfaction • Vestibular apparatus and equilibrium • Hearing • Vision • Clinical assessment of hearing, nystagmus, and vision 	4	4	8



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12	<p>Bone and Muscle System</p> <ul style="list-style-type: none"> • Bone deposition, resorption, and calcium homeostasis • Structure and function of the different muscle cells • Sliding filament theory of muscle contraction • Contractions of skeletal muscles • Energy requirements of skeletal muscle • Neural control of skeletal muscle • Neuromuscular diseases • Factors that affect muscle contraction • Analysis of electromyography using the Biopac system 	3	6	9
13	<p>Endocrine System</p> <ul style="list-style-type: none"> • Hypothalamic hormones • Anterior and posterior pituitary hormones • Adrenal gland hormones • Thyroid and parathyroid gland hormones • Pancreatic hormones • Pineal gland hormone • Gastrointestinal tract hormones • Gonadal and placental hormones • Mechanisms of hormone action • Steroid hormone mechanism of action • Thyroid hormone mechanism of action • Cyclic AMP second-messenger mechanism of action • Phospholipase C-calcium second-messenger of action • Tyrosine kinase second messenger of action • Negative feedback mechanisms • Disorders of the Endocrine system 	3	0	3
14	<p>Blood, Lymphatic and Immune System</p> <ul style="list-style-type: none"> • The function of blood cells • Hematopoiesis • Red blood cell antigens, blood typing, and transfusions • Blood clotting • The structure and function of the lymphatic system • Innate or nonspecific immunity • Adaptive or specific immunity • Active and passive immunity • Blood and Immune diseases • Blood type and the genetics of blood type determination <p>• Enzyme-linked immunosorbent assay lab exercise</p>	3	6	9



15	<p>The Cardiovascular System</p> <ul style="list-style-type: none"> • The structure and function of the heart • Heart sounds • Heart murmurs • The cardiac cycle • The conduction system of the heart • The electrical activity of the heart and the electrocardiogram • The structure and function of the vascular components • Pulmonary and systemic circulation • Cardiac Output • Factors regulating heart rate • Factors regulating stroke volume • Intrinsic and extrinsic control of heart contraction strength • The factors affecting the venous return of blood to the heart • Integration of other systems with the cardiovascular system • The role of the cardiovascular system in thermoregulation • Pathologies of the cardiovascular system • Factors that affect heart rate, blood pressure, and the Electrocardiogram using the Biopac system. 	3	4	7
16	<p>The Respiratory System</p> <ul style="list-style-type: none"> • The structures and functions of the respiratory system • Physical aspects of Ventilation • Mechanics of breathing • External respiration • Transport of the gases in the blood • Internal respiration • Pulmonary function tests • Control of respiration • Pulmonary disorders • Acid-Base balance of the blood. • Spirometry lab exercise using the Biopac system; implications for lung disease 	3	4	7



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17	<p>The Urinary System</p> <ul style="list-style-type: none"> • The structures and functions of the urinary system • Microscopic structure of the kidney • Glomerular filtration • Reabsorption • The countercurrent multiplier system • Hormonal control of reabsorption • Secretion • Renal control of water, electrolyte, and acid-base balance • The role of the kidney in homeostasis • Control of micturition • Diuretics • The effect of diuretics on the cardiovascular system • Disorders of the urinary system • Analysis of constituents of urine and determination of pathological conditions 	3	4	7
18	<p>The Digestive System</p> <ul style="list-style-type: none"> • Layers of the gastrointestinal tract • Salivary glands and digestion in the mouth • Structure and function of the pharynx and esophagus • Structure and digestion in the stomach • Structure and digestion in the small intestine • The role of the liver, gallbladder and pancreas in digestion • Structure and function of the large intestine • Regulation of the digestive system • Absorption of Food • Vitamins • Disorders of the digestive system • Data analysis on digestion of various macromolecules 	3	4	7
19	<p>The Reproductive System</p> <ul style="list-style-type: none"> • The structure and function of the male reproductive system • The structure and function of the female reproductive system • the ovarian cycle • the menstrual cycle • Fertilization, pregnancy, parturition, and lactation • Embryonic sexual development • Disorders of the reproductive system 	3	0	3
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OUT OF CLASS ASSIGNMENTS

- 1 Laboratory reports (e.g., electrocardiogram analysis);
- 2 Pre-lab exercises (e.g., written protocol for experimental laboratory procedures).

METHODS OF EVALUATION

- 1 Laboratory reports;
- 2 Laboratory quizzes;
- 3 Lecture exams including essay questions;
- 4 Final exam including essay questions.

METHODS OF INSTRUCTION

- Lecture
- Laboratory
- Studio
- Discussion
- Multimedia
- Tutorial
- Independent Study
- Collaboratory Learning
- Demonstration
- Field Activities (Trips)
- Guest Speakers
- Presentations

TEXTBOOKS

Title	Type	Publisher	Edition	Medium	Author	ISBN	Date
Human Physiology	Required	McGraw-Hill	15	Print	Fox, Stuart Ira	978-1-259-86462-9	2019