Cerro Coso College

Course Outline of Record Report

02/23/2022

BIOLC255 : Human Physiology

General Information

Author:	• Guck Ooi • Sellers, Claudia • Burch, Andrew
Course Code (CB01) :	BIOLC255
Course Title (CB02) :	Human Physiology
Department:	Science
Proposal Start:	Spring 2022
TOP Code (CB03) :	(0410.00) Anatomy and Physiology
SAM Code (CB09) :	Non-occupational
Distance Education Approved:	Yes
Course Control Number (CB00) :	CCC000341860
Curriculum Committee Approval Date:	05/07/2021
Board of Trustees Approval Date:	07/08/2021
External Review Approval Date:	07/08/2021
Course Description:	This course provides students with an understanding of the function and regulation of the human body and physiological integration of the organ systems to maintain homeostasis. Course content includes neural and hormonal homeostatic control mechanisms, as well as functions of the integumentary, musculoskeletal, circulatory, respiratory, digestive, urinary, lymphatic and immune, reproductive, and endocrine systems.
Submission Type:	Mandatory Revision Cyclical revision. Added co-contributors, made ENGL C101 as prerequsite, added rationales for Methods of Instructions & Methods of evaluation, updated the textbooks, and expanded the course outlines. Course was last assessed in Spring 2019, and all SLOs were met. No impact on this revision.
Author:	No value

Faculty Minimum Qualifications

Master Discipline Preferred:	• Biological Sciences
Alternate Master Discipline Preferred:	• Biological Sciences
Bachelors or Associates Discipline Preferred:	No value
Additional Bachelors or Associates Discipline Preferred:	No value

Course Development Options

Basic Skills Status (CB08)

Course is not a basic skills course.

Course Special Class Status (CB13)

Course is not a special class.

Grade Options

- Letter Grade Methods
- Pass/No Pass

☐ Allow Students to Gain Credit by Exam/Challenge

Allowed Number of Retakes

0

Course Prior To College Level (CB21)

Not applicable.

Rationale For Credit By Exam/Challenge

No value

Retake Policy Description

Type:|Non-Repeatable Credit

☑ Allow Students To Audit Course

Course Support Course Status (CB26)

Course is not a support course

Associated Programs

☑ Course is part of a program (CB24)

Associated Program	Award Type	Active
No value	No value	

Transferability & Gen. Ed. Options

Course General Education Status (CB25)

Y

Transferability

Transferable to both UC and CSU

Transferability Status

Pending

Cerro Coso General Education Requirements	Categories	Status	Approval Date	Comparable Course
Area 1.1	Natural Science Life Sciences	Approved	No value	BIOL 120 B

CSU General Education Certification	Categories	Status	Approval Date	Comparable Course
Area B.2	Scientific Inquiry & Quantitative Reasoning Life Science	Approved	No value	BIOL 120 B
Area B.3	Scientific Inquiry & Quantitative Reasoning Laboratory	Approved	No value	

Intersegmental General Education Transfer Curriculum	Categories	Status	Approval Date	Comparable Course

Area 5.B	Physical & Biological Sciences Biological Science	Approved	No value	BIOL 120 B
Area 5.C	Physical & Biological Sciences Laboratory/Activity	Approved	No value	

C-ID	Categories	Status	Approval Date	Comparable Course
Biology	C-ID discipline	Pending	No value	BIOL 120 B

Units and Hours

Summary

Minimum Credit Units (CB07)	4
Maximum Credit Units (CB06)	4
Total Course In-Class (Contact) Hours	108
Total Course Out-of-Class Hours	108
Total Student Learning Hours	216
Faculty Load	0

Credit / Non-Credit Options

Course Credit Status (CB04)

Credit - Degree Applicable

Course Non Credit Category (CB22)

Credit Course.

Non-Credit Characteristic

No Value

Course Classification Status (CB11)

Credit Course.

Funding Agency Category (CB23)

Not Applicable.

Cooperative Work Experience Education Status (CB10)

☐ Variable Credit Course

Weekly Student Hours

	In Class	Out of Class
Lecture Hours	3	6
Laboratory Hours	3	0
Activity Hours	0	0

Course Student Hours

Course Duration (Weeks)	18
Hours per unit divisor	54
Course In-Class (Contact) Hours	
Lecture	54
Laboratory	54
Activity	0
Total	108

Course Out-of-Class Hours

Lecture	108
Laboratory	0
Activity	0
Total	108

Time Commitment Notes for Students

No value

Faculty Load

Extra Duties: 0

Faculty Load: 0

Units and Hours - Weekly Specialty Hours

Activity Name	Type	In Class	Out of Class
No Value	No Value	No Value	No Value

Pre-requisites, Co-requisites, Anti-requisites and Advisories

Advisory

MATHC055 - Intermediate Algebra (in-development)

The quantitative aspects of Physiology such as reaction stoichiometries, balanced reactions, enzyme kinetics, membrane potentials, half-lives, dosage calculations, cardiac outputs and blood pressures require college-level algebra to fully understand the concepts and significance of these measurements. Students will be required to interpret and comprehend the underlying equations that form the basis of these measurements. The advisory level of MATH C055 will provide the student with the requisite skills to meet these expectations. Relevant outcomes from MATH C055 are:

- Consistently perform signed number operations correctly.
- Demonstrate proficiency with operations of algebraic fractions.
- Use the rules of exponents and radicals to simplify expressions and solve equations.
- Recognize the difference between functions and non-functions.
- Graph a line and write the equation of a line.
- Recognize and graph at least one quadratic - parabola, circle, ellipse, or hyperbola.
- Graph exponential and logarithmic functions.
- Set up and solve word problems related to the skills above.

AND

Advisory

CHEMC101 - Introduction to Chemistry

Students in BIOL C255 work with acids, bases, buffers and pH of living systems. Molarity and molality calculations, osmotic pressure and diffusion in relation to the function of living systems are also covered. Prior knowledge of these concepts aids in the ability to apply to the concepts to living systems. CHEM C101 will provide the student with the requisite skills to meet these expectations. Relevant outcomes from CHEM C101 are:

- Analyze the fundamental features of chemistry including measurement and dimensional analysis of physical properties such as mass, volume, density, solution concentrations, dilutions.

- Perform an analysis of physical and chemical processes using the laws of conservation of mass and energy and information of reactivity and solubility.
- Evaluate the chemical and physical properties of solids, liquids, solutions and gasses.
- Use the periodic chart to assess the properties of materials and to determine realistic bonding stoichiometries.
- Analyze the features of chemistry including physical and chemical properties, naming and writing chemical formulas of compounds along with balancing and classifying chemical reactions.
- Draw and interpret Lewis dot, line bond and short hand structures of inorganic compounds and ions as well as organic compounds and organic functional groups.

AND

Advisory

BIOLC125 - Survey of Anatomy and Physiology

A fundamental understanding of human body structures and their organization facilitates an understanding of how they function as an integrated unit, and their different levels of regulation. BIOL C125 covers the structure and function of all eleven organ systems, as well as the principles of homeostasis and the use of feedback loops to regulate physiological processes. BIOL C125 will provide the student with the requisite knowledge to understand the advanced physiological concepts taught in BIOL C255. Relevant outcomes from BIOL C125 are:

- Recognize and use appropriate terminology to effectively communicate information related to anatomy and physiology.
- Identify and describe anatomical structures and explain the physiological functions of body systems.
- Describe the principles of homeostasis and the use of feedback loops to regulate physiological processes in the human body.
- Apply a basic understanding of anatomy and physiology in the comprehension of disease and health disorders.
- Use the scientific method and the philosophy of science to analyze components of experiments and carry out physiological exercises safely.

AND

Prerequisite

ENGLC101 - Freshman Composition

Students in BIOL C255 must be able to read and comprehend a college-level Biology textbook which are usually written at a Gunning Fog Index of 13 to 14. They are expected to identify central points, both explicit and implied, outline and summarize complex and technical scientific readings, and interpret difficult and figurative language in academic discourse and scientific terminology. Students must also be able to write summaries of assigned readings from the course textbook, answer homework questions using paragraph-length responses, and answer essay questions in clear and error-free prose based on readings from various scientific texts. ENGL C101 provides the student with the requisite skills to meet these expectations. Relevant outcomes from ENGL C101 are:

- Read, analyze, and evaluate a variety of university-level texts for content, context, and rhetorical merit with consideration of tone, audience, and purpose.
- Develop varied and flexible strategies for generating, drafting, and revising essays.
- Evaluate the style of one's own writing and the writing of others and self-correct for greater clarity and directness.
- Write timed essays in class exhibiting acceptable college-level control of mechanics, organization, development, and coherence.
- Integrate the ideas of others through paraphrasing, summarizing, and quoting without plagiarism.
- Proofread and edit essays for presentation so they exhibit no disruptive errors in English grammar, usage, or punctuation.

Entrance Skills

Entrance Skills	Description
No value	No value

Limitations on Enrollment

Limitations on Enrollment	Description

No value	No value

Specifications

Methods of Instruction

Methods of Instruction	Lecture
Rationale	Classroom lectures using texts/graphics/videos presentations and board-work to explain information and concepts from the assigned textbook. Example: Instructors presenting facts and principles on cardiovascular system functions and regulation using Powerpoint presentation.
Methods of Instruction	Written work
Rationale	Assignments on materials presented during lecture. Example: Urinary System - List and describe three pressures operating at the filtration membrane and explain how each influences net glomerular filtration pressure.
Methods of Instruction	Laboratory
Rationale	Hands-on practical work to further explore important physiological ideas and concepts. Individual reading of assigned materials to prepare for and conduct physiological experiments. All lab work involves investigative activities that illustrate the principles of human body function and homeostasis such as respiration, cardiac function, blood pressure, sensory, and motor reflexes, etc. Example: Design and performed experiments to study the effects of caffeine on the response time of a human nerve-controlled reaction.
Methods of Instruction	Instruction through examination or quizzing
Rationale	Formative and summative assessments. Example: Exit quizzes after the end of a lecture series.
Methods of Instruction	Group Work
Rationale	Peer learning through collaborative work. Example: Working in groups of two or three, design and perform experiments to show the effects of pH, temperature and concentration on enzyme activity, and submit one joint scientific report describing your experimental design and findings.

Assignments

Out of class assignments may include but are not limited to:

Readings from the assigned textbook.
Example: Students are expected to read the weekly reading assignments in advance of the lecture. The chapters cover new materials and are written at college-level English with many new technical terms, and must often be read more than once.

Outlining the chapters and incorporating lecture notes with chapter outlines.
Example: Students are expected to outline the assigned text reading and to relate and integrate the outlines with the lecture notes.

Homework assignments.
Example: Students are expected to answer the instructor assigned questions from the relevant text chapters and additional instructional materials other than the text.

Written laboratory reports.
Example: Students are required to write a formal lab report in a format consistent with that published in a scientific journal. The report summarizes the laboratory methods performed, data collected, and data analysis for each week's lab activity. Data should be analyzed in the context of the experiment's hypothesis, and to make conclusions for the experiment.

Methods of Evaluation	Rationale
Tests	Exams and quizzes evaluate the students ability to analyze critically and to apply concepts taught in the course. Example: Quizzes are given on assigned readings. Exam question ask students to describe the mechanism of skeletal muscle contraction. Typically, there are three to four exams a semester and quizzes are given for all assigned readings. Exams and quizzes are typically a combination of short answer, multiple-choice, and true-false questions.
Final Exam	Summative cumulative exam to evaluate student learning, knowledge application, and academic achievement at the end of the course. Example: Final cumulative exam at the end of semester on the functioning of all organ systems in the human body.
Other	Laboratory experiments reinforce topics covered in lectures, and also test the student's ability to apply concepts learned in class, follow written laboratory procedures, and active participation in the experiments. Students also submit laboratory reports which are graded according to a rubric. Example: In the laboratory experiment on 'Physiology responses to high and low glycemic index foods', students measure blood glucose following food ingestion, analyze data, and write up the results in a scientific report.

Equipment

No Value

Textbooks

Author	Title	Publisher	Date	ISBN
Fox, S.I.	Human Physiology, 15th Edition	McGraw-Hill	2018	Currently the latest edition
Silverthorn, D.U.	Human Physiology: An Integrated Approach, 8th Edition	Pearson	2018	Currently the latest edition
Sherwood, L.	Human Physiology: From Cells to Systems, 9th Edition	Cengage Learning	2015	Currently the latest edition

Other Instructional Materials

Description	Lab Manual developed by instructor on-site.
Author	
Citation	Human Physiology Labs

Description	A Laboratory Guide to Human Physiology - Concepts and Clinical Applications, 14th Edition, McGraw-Hill, 2010
Author	Fox, S.I.
Citation	Currently the latest edition

Materials Fee

No

Learning Outcomes and Objectives

Course Objectives

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. Identify key functions of major organ systems and the physiological mechanisms underlying their operation.

4. Demonstrate an understanding of how organ systems of the body are integrated and regulated.

5. Demonstrate an understanding of how homeostasis is maintained in the body.

6. Demonstrate knowledge of metabolic and physiological disorders of the major organ systems.

7. Analyze experimental data to demonstrate physiological principles.

8. Demonstrate an understanding of the scientific method, experimental design, and the philosophyof science. Apply the scientific method and philosophy of science by designing components of and carrying out physiological experiments.

CSLOs

Recognize and use appropriate physiological terminology to describe the form and function of the human body. Expected SLO Performance: 70.0

Apply the fundamentals of chemistry and cell biology in understanding physiological mechanisms.	Expected SLO Performance: 70.0
Analyze body functions in maintaining homeostasis at the cellular, tissue, organ, organ system, and organism level.	Expected SLO Performance: 70.0
Apply physiological concepts in understanding how physiological dysregulation leads to diseases.	Expected SLO Performance: 70.0
Perform lab skills correctly and display a habit of accurate and safe lab practices.	Expected SLO Performance: 70.0

Outline

Course Outline

1) Chemical Composition of the Body
    a) Atoms, Ions, and Chemical Bonds
    b) Carbohydrates and Lipids
    c) Proteins
    d) Nucleic Acids

2) Homeostasis, Control and Feedback Systems
    a) Body Control Systems and Pathways
    b) Negative and Positive Feedback Loops
    c) Examples of Homeostatic Control
        i. Regulation of Body Temperature
        ii. Regulation of Hormone Secretion
        iii. Role of Bone in Homeostasis

3) Cell Structure and Genetic Control
    a) Plasma Membrane and Associated Structures
    b) Cytoplasm and Organelles
    c) Molecular Dogma
    d) Clinical Relevance

4) Cell Division
    a) Mitosis
    b) Meiosis

5) Enzymology and Energetics.
    a) Enzymes as Catalysts
    b) Controlling Enzymatic Activity
    c) Bioenergetics

6) Cell Respiration and Metabolism
    a) Glycolysis and Lactic Acid Fermentation
    b) Aerobic Respiration
    c) Metabolism of Proteins and Lipids
    d) Clinical Relevance

7) Cells and the Extracellular Environment
    a) Diffusion and Osmosis
    b) Carrier Mediated Transport
    c) Membrane Potential
    d) Cell Signaling, and Cell-Cell Communication
    e) Clinical Relevance

8) The Nervous System and Integration
    a) Neurons and Supporting Cells
    b) Membrane Potential and Action Potentials

c) Synapse
d) Neurotransmitters
e) Synaptic Integration
d) Clinical Relevance

9) The Central Nervous System
a) Cerebrum
b) Diencephalon
c) Midbrain and Hindbrain
d) Spinal Cord Tracts
e) Cranial and Spinal Nerves
f) Clinical Relevance

10) The Autonomic Nervous System
a) Involuntary Effectors
b) Divisions of the Autonomic Nervous System
c) Functions of the Autonomic Nervous System
d) Clinical Relevance

11) Sense Organ Function
a) Characteristics of Sensory Receptors
b) Cutaneous Sensations
c) Taste and Smell
d) Vestibular Apparatus and Equilibrium
e) The Ears and Hearing
f) The Eyes and Vision
g) Retina
h) Neural Processing of Visual Information
i) Clinical Relevance

12) Endocrine Glands – Functions and Regulation
a) Glands and Hormones
b) Mechanisms of Hormone Action
c) Pituitary Gland
d) Adrenal Glands
e) Thyroid and Parathyroid Glands
f) Pancreas
g) Autocrine and Paracrine Regulation
h) Clinical Relevance

13) Muscle Physiology
a) Structure and Functions of Skeletal Muscles
b) Mechanisms of Contraction
c) Contractions of Skeletal Muscles
d) Energy Requirements of Skeletal Muscles
e) Neural Control of Skeletal Muscles
f) Cardiac and Smooth Muscles
g) Clinical Relevance

14) Heart and Circulation
a) Functions and Components of the Circulatory System
b) Composition of the Blood
c) Blood pH
d) Structure of the Heart
e) Cardiac Cycle and Heart Sounds
f) Electrical Activity of the Heart and Electrocardiogram
g) Blood Vessels
h) Atherosclerosis and Cardiac Arrhythmias
i) Lymphatic System Functions
j) Clinical Relevance

15) Cardiovascular System Functions and Regulation
a) Cardiac Output
b) Blood Volume

c) Vascular Resistance to Blood Flow
d) Blood Flow to the Heart and Skeletal Muscles
e) Blood Flow to the Brain
f) Blood Pressure
g) Hypertension, Shock, and Congestive Heart Failure

16) The Immune System
a) Non-specific and Specific Responses
b) Active and Passive Immunity
c) Tumor Immunology
d) Diseases Caused by the Immune System

17) Respiratory Physiology
a) The Respiratory System
b) Physical Aspects of Ventilation
c) Mechanics of Breathing
d) Gas Exchange in the Lungs
e) Regulation of Breathing
f) Hemoglobin and Oxygen Transport
g) Carbon Dioxide Transport
h) Effects of High Altitude and Exercise on Respiratory Function
i) Clinical Relevance

18) Urinary System Functions and Regulation
a) Structure and Function of the Kidneys
b) Glomerular Filtration
c) Reabsorption of Salt and Water
d) Renal Plasma Clearance
e) Renal Control of Electrolyte and pH
f) Renal Control of Blood Pressure
g) Clinical Relevance

19) Digestive System Functions and Regulation
a) Esophagus and Stomach
b) Small Intestine
c) Large Intestine
d) Liver, Gallbladder, and Pancreas
e) Neural and Endocrine Regulation
f) Digestion and Absorption of Carbohydrates, Lipids, and Proteins
g) Nutrition
h) Clinical Relevance

20) Regulation of Metabolism
a) Anabolism and Catabolism
b) Metabolic Role of the Integumentary System
i. Thermoregulation
ii. Excretion, Hydration, Blood Flow
iii. Endocrine and Immune Functions

21) Reproduction
a) Sexual Reproduction
b) Endocrine Regulation of Reproduction
c) Male Reproductive System
d) Female Reproductive System
e) Menstrual Cycle
f) Fertilization, Pregnancy, and Parturition
g) Clinical Relevance

Lab Outline

1. Scientific Method
2. Chemistry and Acid-Base Balance
3. Biochemistry

4. Energy and Cellular Respiration
5. Diffusion and Osmosis
6. Nervous System
7. Sensory Physiology
8. Endocrine System and Muscle Contraction
9. Blood and the Heart
    a. Regulation of Blood Pressure
    b. Regulation of Cardiac Output
    c. Cardiac Circulation
10. Respiratory Physiology
11. Physiology of the Renal System
12. Digestion
13. Metabolism and Glycemic Index
14. Reproductive Systems

Laboratory exercises are designed to reinforce lecture topics, and involve experiments related to physiological processes that illustrate the principles of human body function and homeostasis. Laboratory exercises also introduce students to hypothesis driven inquiry and proper scientific reporting. Students learn to use the scientific method in designing and conducting experiments, analyzing data, and make inferences from the results obtained.

Delivery Methods

Delivery Method: Please list all that apply -Face to face -Online (purely online no face-to-face contact) -Online with some required face-to-face meetings (“Hybrid”) -Online course with on ground testing -iTV – Interactive video = Face to face course with significant required activities in a distance modality -Other

- Face to face

Rigor Statement: Assignments and evaluations should be of the same rigor as those used in the on-ground course. If they are not the same as those noted in the COR on the Methods of Evaluation and out-of-class assignments pages, indicate what the differences are and why they are being used. For instance, if labs, field trips, or site visits are required in the face to face section of this course, how will these requirements be met with the same rigor in the Distance Education section? Describe the ways in which instructor-student contact and student-student contact will be facilitated in the distance ed environments.

No Value

Good practice requires both asynchronous and synchronous contact for effective contact. List the methods expected of all instructors teaching the course. -Learning Management System -Discussion Forums -Message -Other Contact -Chat/Instant Messaging -E-mail -Face-to-face meeting(s) -Newsgroup/Discussion Board -Proctored Exam -Telephone -iTV - Interactive Video -Other

- Message
- Chat/Instant Messaging
- E-mail
- Face-to-face meeting(s)
- Telephone

Software and Equipment: What additional software or hardware, if any, is required for this course purely because of its delivery mode? How is technical support to be provided?

No Value

Accessibility: Section 508 of the Rehabilitation Act requires access to the Federal government's electronic and information technology. The law covers all types of electronic and information technology in the Federal sector and is not limited to assistive technologies used by people with disabilities. It applies to all Federal agencies when they develop, procure, maintain, or use such technology. Federal agencies must ensure that this technology is accessible to employees and the public to the extent it does not pose an "undue

burden". I am using -iTV—Interactive Video only -Learning management system -Publisher course with learning management system interface.

- Learning management system

Class Size: Good practice is that section size should be no greater in distance ed modes than in regular face-to-face versions of the course. Will the recommended section size be lower than in on-ground sections? If so, explain why.

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Emergency Distance Education Options The course will operate in remote delivery mode when all or part of the college service area is under an officially declared city, county, state, or federal state of emergency, including (check all that apply) - Online including all labs/activity hours - Hybrid with online lecture and onsite lab/activity hours - Correspondence education in high school and prison facilities - None. This course will be cancelled or paused if it cannot be held fully onsite.

- Online including all labs/activity hours
- Hybrid with online lecture and onsite lab/activity hours