GROSSMONT COLLEGE

COURSE OUTLINE OF RECORD

Curriculum Committee Approval: 05/18/2021

GCCCD Governing Board Approval: 06/15/2021

BIOLOGY 141L – LABORATORY IN HUMAN PHYSIOLOGY

1. Course Number Course Title Semester Units

BIO 141L Laboratory in Human Physiology 1

Semester Hours

3 hours laboratory 48-54 total hours

2. Course Prerequisite

A ”C” grade or higher or Pass in BIO 141 or equivalent or concurrent enrollment in BIO 141 or equivalent.

Corequisite

None

Recommended Preparation

None

3. Catalog Description

A laboratory experience utilizing a lecture and laboratory instruction format, designed to reinforce and expand the student's understanding of basic physiological principles studied in Bio 141. Emphasis is on lab-based investigations of human physiological processes.

4. Course Objectives

The student will:

a. Execute some of the common techniques employed in experimental physiology.

b. Compose written analyses of laboratory observations that:

1) Explain the functions of selected systems in the human body.

2) Relate the explanations to the basic principles of science.

3) Use the concept of physiological homeostasis as the framework of discussion.

c. Formulate hypotheses for laboratory experiments, critically evaluate the design of laboratory experiments and develop an experiment of the students' own design.

d. Analyze experimental observations using the critical thought processes common to life sciences studies.

5. Instructional Facilities

a. Standard biology laboratory classroom.

b. Special aids:

1) Computer workstations equipped for processing data directly from physiological input devices (BioPac)receiving ECGs, EMGs, etc.

2) One microscope per student.

3) General physiology apparatus including respirometry equipment, pH meters, spectrophotometers, sphygmomanometers, etc.

4) Reagents and glassware.

5) Animal care facility.

6. Special Materials Required of Student

4-function calculator

7. Course Content

Laboratory Exercises:

c. Fundamental Principles in Physiology: Diffusion and Osmosis.

1. Factors that affect the rate of diffusion
2. Cell to cell communication
3. The cell membrane and movement of substances across the cell membrane.

d. Data in Physiology:

1) Guidelines for construction of tables and graphs.

2) Introduction to computerized statistical analysis of experimental data.

3) The role of data analysis in the scientific method.

e. Digestion: An Introduction to Experimental Design (enzyme function).

f. Extracellular Fluid:

3) Constituents of blood plasma.

4) Hemostasis: the function of plasma clotting proteins.

g. Blood: Cellular Components.

h. Spectrophotometry: A Technique for Identification and Quantification of Solutes in Solutions:

1) Absorption spectra.

2) Hemoglobin determination.

h. Endocrinology: Thyroid Function studied via online simulation (PhysioEx)**.**

i. Introductory Instructions for the Power-Lab data acquisition system (ADInstruments.com).

j. Muscle Physiology Studies:

3) Reciprocal muscle function

4) Characteristics of human skeletal muscle: Skeletal muscle structure and function.

k. The Cardiovascular System, Function Aspects: the heart, ECG analysis, arterial blood pressure, venous pressure, arterioles, and microcirculation. Major physiological disorders.

l. The Respiratory System, Functional Aspects: respiratory adjustment to changing conditions, spirometry (respiratory volumes), gas partial pressures and the control of respiration. Major physiological disorders.

m. Homeostasis, Integration of Cardiovascular Control Mechanisms: vascular reflexes, cardiovascular adjustments to posture change and prolonged gravity stress, cardiovascular responses to varying respiratory activity, cardiovascular and respiratory adjustments to exercise.

n. Homeostasis: The Buffering Capacity of Blood Plasma.

o. Homeostasis: Renal Regulation of Volume, Osmolarity and Individual Solute Concentrations of Extracellular Fluid. Major physiological disorders.

1. Homeostasis in the Urinary System
2. Glucose Homeostasis Effects of Insulin Imbalance. Major physiological disorders
3. Sensory organ function and cranial nerve function lab.
4. Nervous system physiology including major physiological disorders
5. Cell membrane potentials including graded potentials
6. Action potentials and their effect on pre- and post-synaptic neurons

8. Method of Instruction

a. Laboratory exercises.

b. Experiments.

c. Lecture.

d. Discussion.

e. Demonstration.

9. Methods of Evaluating Student Performance

f. Written laboratory reports: formal and informal write-ups that include data collected or provided and analysis of same.

g. Quizzes in multiple choice and essay formats that require correct spelling and grammar, and analysis of data.

10. Outside Class Assignments

h. Writing lab reports.

i. Text and journal article reading assignments.

c. Library research: background information on selected physiological examples.

11. Representative Text(s)

1. Representative Text(s):

Botten, Ruth; Caldwell, Sue, Shearer, Allison, Didomenico, Angela. *Human Physiology Laboratory Manual,* El Cajon, CA: Grossmont College, 2019

1. Supplementary texts and workbooks:

None

Addendum: Student Learning Outcomes

Upon completion of this course, our students will be able to do the following:

1. Given an observation, write a hypothesis, design an experiment with control and experimental variables, collect and analyze data, graph the results, and interpret the result in the terms of the experimental question.
2. Define systolic and diastolic pressure
3. Construct and label Cartesian graphs, frequency tables, pie charts and scatter plot graphs, given a table of data with two variables.