San Bernardino Valley College
Curriculum Approved: FA01
Last Updated: FA01

I. CATALOG DESCRIPTION:

A. Division: Science
Department: Biology
Course ID: BIOL 102
Course Title: Human Biology
Units: 4
Lecture: 3 hours
Laboratory: 3 hours
Prerequisite: None

B. Course Description:
Introduction to biological principles, emphasizing science as a process and the molecular and cellular basis for the functions of the human body. Topics include concepts of chemistry for students of the biological sciences, function of biological molecules, cell anatomy and physiology, cellular energy pathways, genome replication and expression and reproductive and developmental processes.

C. Schedule Description:
An introduction to biological principles, emphasizing molecular and cellular bases for the functions of the human body.

II. NUMBER OF TIMES COURSE MAY BE TAKEN FOR CREDIT: One

III. EXPECTED OUTCOMES FOR STUDENTS:

Upon successful completion of the course the student could be able to do the following:

A. Critically evaluate and discuss (orally and in writing) scientific and popular literature on biological topics and distinguish scientific fact from interpretation.
B. Collect and interpret biological data; this includes the ability to construct data tables, calculate averages, prepare graphs, critically evaluate results and write laboratory reports.
C. Use scientific methods to generate an hypothesis given a biological problem and propose a means of testing the hypothesis
D. Use the nomenclature for inorganic compounds and interpret the periodic table.
E. Diagram the structure of common atoms and molecules; differentiate among covalent, hydrogen, and ionic bonding.
F. Explain the roles of water, salts, and pH in body homeostasis.
G. Describe the mechanism of enzyme function and discuss environmental influences on enzymatic activity.
H. Identify and differentiate between organic and inorganic molecules.
I. Identify the structure and function of the four major groups of organic molecules (protein, lipids, carbohydrates, and nucleic acids).
J. Follow a molecule of glucose through the three major stages of cellular respiration and list the end products.
K. Diagram a positive and negative feedback system and relate these relationships to homeostasis in living organisms.
L. Compare and contrast the major taxonomic categories that classify living organisms, and use a taxonomic key and Linnean nomenclature to scientifically identify organisms.
M. Describe cell membrane structure and function, and predict the consequence to a cell placed in a hypertonic or hypotonic solution.
N. Compare and contrast prokaryotic and eukaryotic cell architecture and organelle and structural functions.
O. Compare and contrast the structure and functions of RNA and DNA; given a sense strand of DNA, predict the products of replication and protein synthesis.
P. Name the stages of the cell cycle, including mitotic stages, and compare the mechanisms of mitosis and meiosis.

VI. CONTENT:

Lecture:

A. Scientific method
   1. Historical foundations of modern biology
   2. Methods of scientific evaluation
B. Classification of life
   1. Characteristics of life
   2. Homeostasis and feedback systems
   3. Linnean taxonomy and binomial nomenclature
   4. Overview of the kingdoms of life and viruses
      a. bacteria
      b. protista
      c. plants
      d. fungi
      e. animals
C. Essential Chemistry
   1. The Atom
      a. structure
      b. energy levels
      c. Ions and charge
      d. isotopes
      e. atomic mass and the elements
   2. The Periodic Table
   3. Chemical Nomenclature
   4. Molecules from Atoms
      a. chemical bonds
      b. molecular structure
      c. acids, bases, salts
      d. pH and buffers
   5. Role of water and other essential inorganic molecules
   6. Oxidation-reduction reactions
   7. Introduction to organic chemistry
      a. carbohydrates
      b. lipids
      c. proteins
      d. nucleic acids
   8. Introduction to biochemistry
D. Cells and Virus structure
   1. Comparative architecture
      a. prokaryotic cells
      b. eukaryotic cells
   2. Membrane function
      1. diffusion, osmosis and other transport mechanisms
      2. cell size limitations
   3. Structure and function of eukaryotic cell organelles
   4. Virus structure
E. Tissue types
   1. epithelial
   2. connective
   3. nervous
   4. muscle
F. Cellular Metabolism
   1. Photosynthesis
   2. Respiration
      a. aerobic
         i. glycolysis

ii. Kreb's cycle
iii. oxidative phosphorylation
b. anaerobic
3. Enzyme functions

G. Information systems
1. DNA structure
2. RNA types and their functions
3. DNA replication
4. Protein synthesis
5. Mendelian genetics

H. Reproductive Biology
1. asexual (mitosis)
2. sexual (meiosis)
3. Human Reproductive system

I. The Respiratory System

J. The Immune System
1. Organ architecture
2. Cells

K. The Endocrine System
1. Organ architecture
2. Hormones

Laboratory:

A. Scientific Method

B. The Microscope
1. measurement
2. observation

C. Kingdom Survey

D. Classification

E. Standard for Measurement
1. Scientific Notation
2. The Metric System
3. Measurements
a. mass
b. weight
c. volume
d. temperature
e. density

F. Molecular Models
1. organic molecules
2. mole theory

G. Enzyme functions
1. fermentation
2. digestion
3. acids, bases, and pH
4. buffers

H. Membrane Function
1. diffusion
2. osmosis
3. active transport

I. Genetics
1. DNA
2. RNA

J. Cellular reproduction
1. mitosis
2. meiosis

V. METHODS OF INSTRUCTION

A. A lecture format is the foundation of delivery of information in the lecture portion of the course. It is complemented with questions to promote critical thinking and problem solving. Textbook illustrations are utilized in class to emphasize the subject and to assist students in interpretation of reading materials.
B. Short discussion sessions are utilized to emphasize involved concepts. After an introduction and explanation of a completes topic, students are placed in small groups to explain the concept to each other and discuss any problems. This is particularly helpful with students who are hesitant to interact with the instructor.
C. Videos, computer slide presentations are used to illustrate lecture materials that are best illustrated with animation.
D. The laboratory portion of the course will actively engage students in collecting and analyzing data. Students will propose hypotheses and develop experiments to test the hypotheses, observe and record results, and write reports. Students will use microscopes and other laboratory equipment.

VI. TYPICAL ASSIGNMENTS

A. Draw, label and describe the architecture of a lymph node.
B. Compare and contrast eukaryotic cell and prokaryotic cell structural organization.
C. Describe by the use of models the process of DNA synthesis.
D. What do you need to know to diagram an atom?

VII. EVALUTION:

A. Methods of Evaluation
   1. Combination objective and essay examinations in lecture and lab; practical exams may also be used in the laboratory portion of the course.
   2. Short written homework assignments as required to emphasize concepts introduced in lecture.
   3. Typed laboratory reports on experiments will be required to demonstrate Proficiency in scientific method and data analysis. Reports will follow the scientific format with sections for purpose, methods and materials, results, and discussion and conclusions.
B. Frequency of Evaluation
   1. Lecture exams will be given every three to four weeks with no less than 3 midterms and a final exam each semester.
   2. Laboratory quizzes will be given approximately every three weeks.
   3. Laboratory reports are assigned for each experiment that involve the development of data for analysis for a minimum of three reports for the semester.
C. Example questions
   1. A series of enzymes catalyze the reaction X --- Y--- Z ----A. Substance “A” binds to the enzyme that converts X to Y at a position remote from its active site. This binding decreases the activity of the enzyme.
      In this example substance X is
      a. a coenzyme
      b. an allosteric inhibitor
      c. a substrate
      d. a competitive inhibitor
      e. the product
      Substance “A” functions as
      a. a conenzyme
      b. an allosteric inhibitor
      c. the substrate
      d. an intermediate
      e. a competitive inhibitor

2. A given solution is found to contain 0.000l mole of hydrogen ion (H+). Which of the following best describes this solution?
   a. acidic: H+ acceptor
   b. basic: H+ acceptor
   c. acidic: H+ donor
   d. basic: H+ donor
   e. neutral
3. Explain why the boundaries of the endocrine and the nervous system are not sharply defined.
4. Identify the hormones released by the anterior lobe of the pituitary and tell which target tissues or organs each acts on.
5. All cells composing the human body are diploid except for any gametes that may be produced. True/False Explain.

VIII. TYPICAL TEXT(S):

Starr, Cecie and Beverly McMillan. Human Biology,3rd Edition, Pacific Grove, California, Brooks/Cole-Wadsworth, 1999
Knapp, Loren, Perspectives in Human Biology, Belmont, California, Wadsworth Publishing Company, 1998
Fisher,J, and J.R.P. Arnold, Instant Notes in chemistry for Biologists, Secaucus, New Jersey, Springer-Verlang, 1999.
Clifford, Craig, Laboratory Activities Manual in Human Biology, San Diego, California, Saunders College Publishing, 1998
Ross, Frederick, Laboratory Manual Foundation of Allied Health Sciences; an introduction to chemistry and cell biology, 4th Edition, Chicago, Illinois, Wm. C. Brown Publishers, 1997

IX. OTHER SUPPLIES REQUIRED OF STUDENTS: None