

Crafton Hills College

Course Outline

1. Discipline: Biology
2. Department: Biological Sciences
3. Course Title: Exploring Biology
4. Course I.D.: BIOL 119
5. Prerequisite(s): None

Corequisite(s):None

Departmental
Recommendation(s): None

6. Semester Units: 3

7. Minimum Semester Hours:

Lecture: 48 Lab: 0 Clinic: 0 Field: 0

8. Need for the Course:

Exploring Biology is a one-semester course in introductory biology. Provides an excellent introduction to the nature of life from the simplest single-celled organisms to complex plants and animals and human beings. This course gives students the option of taking a biology course through distance education.

BIOL 119 is designed for Biology and non-Biology majors. Associate Degree applicable and transfers to CSU and UC.

9. Goals for the Course:

This course is designed to help students:

- (1) Understand that life is dynamic and continually changing.
- (2) Recognize that the living world exhibits both diversity and unity: organisms vary immensely, yet they also share many fundamental characteristics.
- (3) Comprehend that life is a marvelously complex orderly system sustained by energy.
- (4) Understand that the natural world exhibits organization: the different structures we see in nature tend to repeat themselves in different organisms and on different scales.

- (5) Identify that life seeks stability: organisms work to maintain a stable internal environment despite changing external conditions.
- (6) Appreciate how life is both interdependent and competitive: all organisms depend on the environment and on one another for their basic needs, yet they must struggle against nature and each other to survive.

10. Catalog/Schedule Description:

Introduction to the nature of life from the simplest single-celled organisms to complex plants and animals and human beings, describes the subject matter in biology, examines the scientific method and considers both its promises and limitations. Students will gain understanding of and appreciation for the natural world.

11. Entrance Skills:

- A. Requisite Skills: None
- B. Corequisite Skills: None

12. Course Objectives:

Upon completion of the course, students will be able to:

- (1) Summarize how DNA can affect the traits of offspring from generation to generation.
- (2) List and generally describe the six *kingdoms* into which living organisms are classified.
- (3) Generally describe how biologists proceed through a scientific investigation.
- (4) Identify the properties of water that make it vital for life.
- (5) Describe *diffusion*, including osmosis. Explain what causes diffusion, and identify the factors that influence its rate.
- (6) Define and give examples of *hypertonic*, *hypotonic*, and *isotonic* solutions, and note the direction of solute and solvent movement when any two of these solutions are separated by a selectively permeable membrane.
- (7) Identify those features that generally distinguish plant cells from animal cells.
- (8) Explain how enzymes speed up chemical reactions, and describe the mechanisms that regulate enzyme activity.
- (9) Identify the major reasons why cells use energy.
- (10) Describe the properties of acids, bases, and buffers. Offer an example of how each of them functions in the human body, and relate this to the concept of enzyme regulation.
- (11) Describe the key steps of the light-dependent and light-independent reactions of *photosynthesis*, noting the raw materials required, the end products, and the locations for each phase.

- (12) Understand what is meant by the *cell cycle*, and relate where *mitosis* fits into the cycle.
- (13) Summarize the events that occur during each phase of mitosis.
- (14) Discuss the potential of the cell cycle to control events such as cancer formation and aging.
- (15) Compare mitosis and meiosis with respect to overall purpose, where and when each occurs, and the resulting number of chromosomes.
- (16) Determine all the possible kinds of gametes that can be formed from a given genotype, and use this information with a Punnett square to predict the outcomes of *monohybrid* and *dihybrid* crosses.
- (17) Distinguish patterns of *autosomal inheritance* from those of *X-linked inheritance*.
- (18) Explain how DNA is replicated and repaired, what materials are needed for replication, and the importance of that process to cell division.
- (19) State the major differences between DNA and RNA, and describe how the structure of DNA determines the structure of the three forms of RNA during *transcription*.
- (20) Describe mutation and the other events that contribute to variation within a population.
- (21) Describe a population in terms of its *gene pool* and *allele (gene) frequency*, and outline the major conditions required to maintain *genetic equilibrium*.
- (22) State the purpose of a *classification system*, and list—in sequence—the major units or groupings of the system we use today.
- (23) Describe the various functions of stems, leaves, and roots.
- (24) Explain how water is absorbed, transported through the *xylem*, and lost by a plant. Note the role of transpiration, osmotic pressure, and the cohesiveness of water.
- (25) Draw and label the parts of a flower.
- (26) List the various hormones that regulate plant growth and metabolism, and describe their known effects on plants.
- (27) Define *homeostasis*, and describe how *feedback control mechanisms* help maintain this condition.
- (28) Describe the structure of the human *integumentary system*, and discuss the skin's role in maintaining homeostasis.
- (29) Compare “skeletal” and “muscular” components of earthworms, crayfish, and humans, and describe how these components interact to produce movement.
- (30) Compare *open* and *closed* circulatory systems with respect to structure and operation. Use different organisms as examples.
- (31) Use the human heart to trace the path of blood flow through the *pulmonary* and *systemic circuits*, and compare this pathway with that of the other vertebrates.
- (32) Define the term *blood pressure*, and describe the mechanisms that regulate it.
- (33) Generally compare the body's *nonspecific* and *specific* immune response, noting the basic features that distinguish the latter.
- (34) Compare gas exchange in unicellular and multicellular organisms, noting the challenges faced by larger body sizes.
- (35) Describe the structure of the human respiratory system, and explain how breathing cycles air to and from respiratory surfaces.
- (36) Define *ingestion*, *digestion* (physical and chemical), and *absorption*.

- (37) Describe the gross anatomy of the *urinary system* and explain how the various components work together to filter, reabsorb, and secrete water and solutes to form urine.
- (38) Describe the general purpose and structure of *neurons*.
- (39) Describe the general structure of a *synapse*, and explain how it transmits information.
- (40) Identify the different types of sensory receptors found in the animal kingdom, and offer examples of each.
- (41) Contrast the structure and general role of an *exocrine* gland with that of an *endocrine* gland.
- (42) Define a *hormone*, and describe in general how hormones integrate and control metabolic activities in animals.
- (43) Compare *asexual* and *sexual* reproduction, and discuss the adaptive advantages and problems associated with having separate sexes.
- (44) Describe the structure and function of the human male and female *reproductive systems*.
- (45) Outline the principal events of prenatal human development, noting the major events of each *trimester*.
- (46) Define the terms *population*, *community*, *ecosystem*, and *biosphere*, and note how they relate to each other.
- (47) Describe how *density-dependent* and *density-independent* controls might modify an S-shaped growth curve.
- (48) Describe the processes at work in *biogeochemical cycles*. Illustrate how organisms interact with chemical reservoirs in the environment.
- (49) Use an example to illustrate the concept of *biological magnification*.
- (50) Define *biome*, and describe how climate, topography, and other physical characteristics cause the unique plant and animal associations found in each region.
- (51) Relate the first and second laws of thermodynamics to the use of world resources and food supplies, and discuss the potential for all people on Earth to enjoy the benefits of an industrialized lifestyle.
- (52) Distinguish between renewable and nonrenewable energy sources. Discuss the current level of use for each and the promise they hold for the future.

13. Representative Texts and Instructional Materials:

Starr, Cecie. 2003. 5th Ed. *Biology: Concepts and Applications*. Brooks/Cole, Thompson Learning. Belmont, CA.

Kellogg, Gerald. 2003. 3th Ed. *Cycles of Life: Exploring Biology*. Coast Learning Systems, Brooks/Cole, Thompson Learning. Belmont, CA.

14. Course Content:

- (1) Biological concepts and chemical foundations, proteins.
- (2) Cell structure and function, and cell division.

- (3) Metabolism and energy transfer.
- (4) Patterns of inheritance, DNA structure and function.
- (5) Viruses, Bacteria, and Protistans
- (6) Fungi, Plants, and Animals
- (7) Plant tissues, nutrition and transport
- (8) Plant reproduction and development
- (9) Animal structure and movement
- (10) Animal circulation, respiration, and immunity
- (11) Animal digestion and fluid balance
- (12) Animal neural and endocrine control
- (13) Animal reproduction and development
- (14) Populations and communities
- (15) Ecosystems and the biosphere
- (16) Human impact on the biosphere

15. Methods of Instruction:

- 15.1 The course combines lectures, class discussions, broadcast audio-visual presentations, reading, and group reviews.

Students are required to pass examinations in both objective and subjective formats, including essay, multiple choice, and true/false.

16. Assignments and Methods of Evaluation:

- (1) Exams 50-100%
- (2) Homework 0-50%
- (3) Biology Report 0-5%