SAN BERNARDINO VALLEY COLLEGE
BIOLOGY 100: GENERAL BIOLOGY

I. CATALOG DESCRIPTION:

A.

Division:	Science
Department:	Biology
Course ID:	BIOL 100
Course Title:	General Biology
Units:	4
Lecture:	3 hours
Laboratory:	3 hours
Prerequisite:	None.

B. Course Description:

Introductory course for non-majors emphasizing scientific method in investigating the origins, physiology, ecological roles, and comparative characteristics of living organisms.

Schedule Description:

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

III. EXPECTED OUTCOMES FOR STUDENTS:

Upon successful completion of the course, the student should be able to:

A. Define basic vocabulary and concepts of biology at the molecular, cellular, organism, and ecosystem levels.
B. Compare and contrast basic anatomical, physiological, and ecological features of living organisms at the kingdom, phylum, and class level of taxonomy.
C. Explain and discuss applications of basic biological concepts to human health and ecosystem issues.
D. Read, discuss, and critically evaluate biological information, based on principles of scientific method and research design.
E. Create simple hypotheses and generate questions from biological observations.
F. Collect scientific data using basic biological measurement tools such as metric rulers, analytical balances, thermometers, and microscopes.
G. Manipulate and interpret biological data, by organizing data tables, calculating averages, preparing graphs, and evaluating results.
H. Prepare laboratory reports in scientific report format.

IV. CONTENT:

LECTURE TOPICS
A. Biology overview
    1. What is life?
    2. How do we study and organize life?
    3. What are the historical foundations of modern biology?
    4. How can a non-scientist evaluate new scientific information?

B. Molecular level concepts
   1. What are the important biological molecules?
   2. How do organisms get their energy?
      a. autotrophic pathways
      b. heterotrophic pathways
C. Cellular level concepts
   1. What is a cell?
   2. What are the basic structures and functions of cells?
      a. prokaryotic
      b. eukaryotic
D. Taxonomic concepts
   1. What are the different types of microscopic life?
      a. non-cellular (viruses, prions, viroids)
      b. the single-celled prokaryotes
      c. the single-celled eukaryotes
   2. What are the different types of multicellular life?
      a. fungi
      b. plants
      c. animals
E. Principles of genetics
   1. How are traits passed on?
      a. asexual cell division - mitosis
      b. gametogenesis - meiosis
      c. simple Mendelian genetics
   2. What is the role of DNA in inheritance and cellular function?
      a. DNA replication and protein synthesis
      b. modern genetic engineering
F. Organism-level concepts
   1. How do organisms maintain homeostasis?
      a. nutrient intake, digestion, and waste disposal
      b. circulation, fluid balance, temperature regulation
   2. How do organisms coordinate their complex functions?
      a. senses, nervous system
      b. endocrine system
   3. How do organisms defend themselves against disease and damage?
   4. How does a complex multicelled organism develop from a single cell?
G. Population-level concepts
   1. How do populations adapt and change?
      a. microevolution
      b. speciation
      c. macroevolution
   2. What controls population growth and distribution?
H. Community & Ecosystem-level concepts
   1. What types of species interactions exist?
      a. symbioses
      b. energy and nutrient flow through food chains and webs
   2. Why should humans care about environmental issues?
      a. biodiversity and world biomes
      b. pollution and resource crises

LABORATORY TOPICS

Labs are selected from a wide range of biological topics, with the goal of introducing and actively engaging students in the scientific process.

A. Observing, recording, and organizing information.
B. Identifying patterns and generating questions from observations.

C. Creating multiple simple hypotheses to explain observations.
D. Designing simple experiments to test hypotheses.
E. Collecting data using metric rulers, analytical scales, microscopes, thermometers, and other simple laboratory tools.
F. Organizing data into data tables.
G. Analyzing data by examining averages, maximums, minimums, and mode.
H. Constructing graphs of laboratory data.
I. Evaluating experimental outcomes.
J. Writing laboratory reports in standard scientific format.

V. METHODS OF INSTRUCTION:

A. Lectures supported by audio-visual aids and demonstration material.
B. Directed discussion and cooperative-learning group activities.
C. Readings and visual material from textbook and supplementary handouts.
D. Hands-on laboratory activities emphasizing partnerships and team work.
E. Short answer and essay homework assignments.

VI. TYPICAL ASSIGNMENTS:

A. Read, outline, and respond to an essay on a current topic related to a lecture. The essay may be from the textbook, popular literature, or scientific journal. **Example**: "Cloning the Wooly Mammoth" Discover Magazine, April 1999. Write a one-page single-spaced typed essay that answers to the following questions: 1) What (in simple terms) is the basic scientific procedure planned? 2) What obstacles exist to accomplishing the goal? 3) What is the scientists' purpose in doing this? 4) What is your personal opinion/reaction to this proposed research? Explain the reasons for your responses.

B. In the laboratory, participate in team discussion to identify and list independent variables affecting cardiovascular fitness. Develop a testable hypothesis for one independent variable of your choice and be prepared to discuss how well it fulfills requirements for testing. Reach a class consensus on desirable parameters for the experiment. Participate in the experiment and collect class data. Contribute to class discussion of possible uncontrolled variable or sources of error in the experiment.
At home, analyze class data and construct graphs that illustrate trends. Write a one page (typed, single-spaced) report on the experiment in scientific report format: Introduction (clearly identify question, hypothesis, and background), Methods, Results, and Discussion (interpret results in relationship to predictions, sources of error and uncontrolled variables; generate new questions or new ideas for experiments) .

VII. EVALUATION:

A. Methods of Evaluation
1. LABORATORY
a. Participation.
b. Graded worksheets done in class that typically include single-sentence or paragraph answers. Some worksheets include student sketches and data.
Sample: Prepare a wet mount slide of pond water and observe it using a compound light microscope. Focus your observations on one interesting organism and any organisms and environment it interacts with. Estimate the size of the organisms you see. Draw the organism and take notes of any behaviors you see. Generate a list of questions that arise from your observations.

c. Graded formal laboratory reports prepared outside of lab time.
Sample: After completing the osmosis/diffusion experiment, analyze the data and prepare a formal lab report following the instructions on page 4 of your lab manual. The typewritten portion should be one typed page single-spaced, with graphs and other data attached.
d. In-class quizzes.
Sample: What is the topic for today's laboratory experiment?

2. LECTURE
a. Participation.
b. Graded essays.
Sample 1: Describe an example from your life in which you followed the scientific method. Be sure to clearly identify each step in the process.
Sample 2: What fundamental assumptions underlie Darwin's theory of evolution by natural selection?
c. Problems in genetics, anatomy, etc.
Sample 1: A color-blind male marries a woman with no family history of color-blindness. Predict the likelihood of their children exhibiting the trait.
Sample 2: Color the diagram of selected vertebrate forelimbs (frog, bat, horse, whale, human) to show the structural homologies; for example, color of each humerus blue.

B. Frequency of Evaluation
This course is taught in multiple sections and by a variety of instructors. To establish standardization, while retaining options for faculty academic freedom, the following framework has been established.
1. LABORATORY:
15 weekly graded assignments, selected from the departmentally-published biology lab book or substitute activities that meet course goals. A minimum of three and a maximum of six of these assignments will be submitted as formal laboratory reports (essays in scientific format). Worksheets requiring in-class student writing are required whenever formal laboratory reports are not assigned. The cumulative total of critically-evaluated student writing is intended to be approximately 1,500 words.
2. LECTURE:
Faculty will give evaluative assignments or exams no less than 4 times during the semester. While a variety of formats may be used to evaluate student acquisition of course concepts, a target of 2,500 words of critically-evaluated student writing is expected in the lecture section.

VIII. TYPICAL TEXT(S):

A. Starr and Taggart. Biology: The Unity and Diversity of Life, 8th ed., Belmont, California, Wadsworth Publishing Company, 1998.
B. Tobin & Dusheck. Asking About Life, Fort Worth, Texas, Saunders College Publishing, 1998.
C. Audesirk & Audesirk. Biology: Life on Earth, 5th ed., Upper Saddle River, New Jersey, Prentice-Hall, 1999.

IX. OTHER SUPPLIES REQUIRED OF STUDENTS:

A. LECTURE
   1. Individualized instructor supplementary handout packet ($2-$3).

B. LABORATORY
   1. Departmentally-produced laboratory manual ($2-$3).
   2. Colored pencils.
   3. Metric ruler.
   4. Simple calculator.
   5. Supply of graph paper.
   6. Watch with second hand.