

Las Positas College  
3000 Campus Hill Drive  
Livermore, CA 94551-7650  
(925) 424-1000  
(925) 443-0742 (Fax)

## Course Outline for BIO 30

### INTRODUCTION TO COLLEGE BIOLOGY

Effective: Fall 2019

#### I. CATALOG DESCRIPTION:

BIO 30 — INTRODUCTION TO COLLEGE BIOLOGY — 4.00 units

Basic principles of biology. Cell structure and function, cell division, cell metabolism, reproduction, genetics, taxonomy, origin of life, and evolution. Laboratory emphasis on developing various laboratory skills, using the metric system, collecting data, graphing, interpreting data, and preparing for and taking laboratory exams. Designed to prepare the necessary concepts and laboratory skills and experience that are needed to succeed in more advanced courses in biology.

3.00 Units Lecture 1.00 Units Lab

#### **Strongly Recommended**

MATH 110 - Elementary Algebra  
with a minimum grade of C  
or

MATH 110B - Elementary Algebra B  
with a minimum grade of C

- Eligibility for ENG 1A -

#### **Grading Methods:**

Letter Grade

#### **Discipline:**

- Biological Sciences

	<b>MIN</b>
<b>Lecture Hours:</b>	54.00
<b>Lab Hours:</b>	54.00
<b>Total Hours:</b>	108.00

#### II. NUMBER OF TIMES COURSE MAY BE TAKEN FOR CREDIT: 1

#### III. PREREQUISITE AND/OR ADVISORY SKILLS:

**Before entering this course, it is strongly recommended that the student should be able to:**

##### A. MATH110

1. Perform arithmetic operations on real numbers and polynomial expressions;
2. Simplify and evaluate algebraic expressions;
3. Translate a verbal statement into an algebraic expression;
4. Solve linear equations in one variable;
5. Solve a formula for a specified variable;
6. Solve and graph a linear inequality in one variable and express the solution using correct interval or set notation;
7. Find the equation of a line;
8. Apply concepts of slopes and rates of change;
9. Write numbers and perform computations using scientific notation;

##### B. MATH110B

1. Solve systems of linear equations in two variables by one of the following methods: graphing, elimination or substitution;
2. Write numbers and perform computations using scientific notation;
3. Solve, justify, and interpret the solution in the context of a modeling problem.

##### C. -Eligibility for ENG 1A

1. Use strategies to assess a text's difficulty, purpose, and main idea prior to the act of reading
2. Annotate a text during the act of reading
3. Employ strategies that enable a critical evaluation of a text
4. Respond critically to a text through class discussions and writing
5. Use concepts of paragraph and essay structure and development to analyze his/her own and others' essays
6. Write effective summaries of texts that avoid wording and sentence structure of the original
7. Respond to texts drawing on personal experience and other texts
8. Organize coherent essays around a central idea or a position

9. Apply structural elements in writing that are appropriate to the audience and purpose
10. Provide appropriate and accurate evidence to support positions and conclusions
11. Produce written work that reflects academic integrity and responsibility, particularly when integrating the exact language and ideas of an outside text into one's own writing
12. Utilize effective grammar recall to check sentences for correct grammar and mechanics

#### IV. MEASURABLE OBJECTIVES:

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

- A. Describe and apply the scientific method and how it is used by scientists to further scientific knowledge
- B. Cite the characteristics and levels of organization exhibited by all living organisms
- C. Know the use of light microscope and dissecting scope
- D. Describe how cells/specialized cells are structured and function
- E. Describe basic cell metabolism
- F. Describe/contrast, mitosis, and meiosis
- G. Describe structure, transmission and expression of genes
- H. Explain the Darwinian concept of evolution as modified by modern scientific knowledge
- I. Describe how the modern (binomial) system names and classifies organisms

#### V. CONTENT:

- A. Introduction – Exploring Life
  1. Characteristics of life
  2. Levels of organization
  3. Process of science
    - a. Nature of biological inquiry
    - b. Power of experimental tests
- B. Chemical Basis of Life
  1. Elements, atoms, molecules, ions
  2. Chemical bonds in biological molecules
  3. Properties of water
  4. Acids, bases, pH and buffers
- C. Molecules of Life
  1. Molecules of life from structure to function
  2. Chemical reactions, synthesis and hydrolysis reactions
  3. Carbohydrates, lipids, proteins, nucleic acids
- D. Structure and Function of the Cell
  1. Introduction to the cell – Prokaryotes – Eukaryotes
  2. Eukaryotes – Organelles
- E. Working Cell
  1. Membrane structure and function
  2. Enzyme structure and function
- F. Cellular Metabolism
  1. Energy relationships, Cellular Respiration/Photosynthesis; Autotrophs/Heterotrophs
  2. Stages of cellular respiration and fermentation and photosynthesis
  3. Organic molecules as fuel for cellular respiration
  4. Products of cell respiration-where/how they are used.
- G. How Cells Reproduce
  1. Nuclear and cell division mechanisms
  2. Eukaryotic cell cycle and mitosis
    - a. Meiosis and sexual reproduction
  3. Crossing over
  4. Alterations of chromosome number and structure
- H. Observing Patterns in Inherited Traits
  1. Mendel's insight into inheritance patterns
  2. Variations on Mendel's Law
- I. Chromosomes/Human Genetics/Inherited Diseases
  1. Chromosomal basis of inheritance
  2. Sex chromosomes and sex linked genes
- J. DNA Structure and Function
  1. Discovery of DNA structure
  2. DNA replication and repair
- K. DNA to Proteins
  1. How is RNA transcribed from DNA
  2. Deciphering mRNA transcripts
  3. Translating mRNA into protein
  4. Mutations
- L. Control of Gene Expression
  1. Gene regulation
  2. Differentiation
- M. DNA Technology
- N. Process of Evolution
  1. Theory of natural selection
  2. Population genetics
  3. Modes of natural selection
- O. Macroevolution and Microevolution
  1. Concept of species
  2. Mechanism of speciation
- P. Origin and Early Evolution of Life
  1. How did cells originate (Early earth)
  2. First cells
- Q. Characteristics and Relationships among Domains and Eukaryotic Kingdoms (systematics)
- R. Human Anatomy and Physiology
  1. Selected organ systems
- S. Basic Principle of Ecology and ecological relationships
  1. Populations
  2. Communities
  3. Ecosystems

#### VI. LAB CONTENT:

- A. The microscope
- B. Microscopic study of cells
- C. Chemistry for biologists
- D. Unicellular Organisms
- E. Movement across membranes
- F. Enzyme function
- G. Cellular respiration
- H. Cell division and cell specialization
- I. Patterns of Inheritance
- J. DNA
- K. Biotechnology
- L. Selected Organ Systems (e.g., Cardiovascular, Excretory, Respiratory, Skeletal)
- M. Plants and/or photosynthesis

#### VII. METHODS OF INSTRUCTION:

- A. **Field Trips** -
- B. **Discussion** -
- C. **Lecture** -
- D. Multimedia presentations
- E. **Lab** -

#### VIII. TYPICAL ASSIGNMENTS:

- A. Read and summarize lab procedure prior to lab
- B. Genetics word problems
- C. Written assignments
  - 1. Evaluate claims and sources
  - 2. Research paper
  - 3. Lab report
- D. Read book chapters

#### IX. EVALUATION:

##### **Methods/Frequency**

- A. Exams/Tests
  - Four per semester
- B. Oral Presentation
  - Oral and visual presentation on research topic
- C. Home Work
  - Preparation for laboratory activities prior to lab.
- D. Lab Activities
  - Laboratory reports

#### X. TYPICAL TEXTS:

- 1. Reece, Jane, Martha Taylor, Eric Simon, and Jean Dickey. *Campbell Biology, Concepts and Connections*. 9th ed., Pearson, 2018.
- 2. Mader, Sylvia, and Michael Windelspecht. *Inquiry to Life*. 15th ed., McGraw-Hill, 2017.
- 3. Adams, J.. Biology 30 Laboratory Manual. Las Positas College , 2008.
- 4. Mader, S.. Lab Manual for Inquiry into Life. McGraw-Hill , 2017.

#### XI. OTHER MATERIALS REQUIRED OF STUDENTS:

- A. In addition to textbook, student may use publishers website, student CD (provided with the text), and other media.
- B. Unipak slides