

Las Positas College
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Course Outline for BIO 10

INTRODUCTION TO THE SCIENCE OF BIOLOGY

Effective: Fall 2018

I. CATALOG DESCRIPTION:

BIO 10 — INTRODUCTION TO THE SCIENCE OF BIOLOGY — 4.00 units

This course focuses on basic principles of biology, including scientific investigation and the study of the nature of living things. Focus is on student understanding of evolution and the unity and diversity of life from the molecular level to ecosystems and biosphere. Designed for non-majors in biology and biomedical sciences.

3.00 Units Lecture 1.00 Units Lab

Grading Methods:

Letter or P/NP

Discipline:

- Biological Sciences

	MIN
Lecture Hours:	54.00
Expected Outside of Class Hours:	108.00
Lab Hours:	54.00
Total Hours:	216.00

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

III. PREREQUISITE AND/OR ADVISORY SKILLS:

IV. MEASURABLE OBJECTIVES:

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

- Describe the scientific method and how it is used by scientists to further scientific knowledge in biology
- Explain the characteristics exhibited by all living things
- Describe how a cell is structured, and explain how it functions in terms of cell membrane, genetic control mechanisms, and metabolism
- List the various kinds of specialized cells, both plant and animal, describe each, and state their functions
- Describe how a typical vertebrate animal develops from a fertilized egg to the adult form
- Describe the following vertebrate organ systems and list the principal functions of each: integumentary, skeletal, muscular, nervous, cardiovascular, respiratory, excretory, digestive, endocrine, reproductive
- Describe asexual and sexual reproduction and the benefits and drawbacks of each
- Describe the modern (binomial) system of naming and classifying plants, animals and other organisms in the biosphere
 - Describe ecological concepts such as biome, ecosystems, succession, fire ecology, and biodiversity
- Describe major environmental problems facing the world and know potential solutions
- Explain the concept of evolution through natural selection
- Use a compound microscope to examine specimens

V. CONTENT:

- Scientific method
 - Definition
 - Origin
 - Applications
 - Limitations
 - Interdisciplinary relationships of science
 - Science vs. pseudoscience
- Cell theory of life
 - Historical development
 - Characteristics of living things
 - Cell organelles and functions
 - Differences between plant and animal cells
 - Viral agents and prions
- Plants and animals
 - Classification
 - Phylogeny

- 3. Cladistics
- 4. Morphology
- 5. Genetics
- D. Metabolism
 - 1. Photosynthesis
 - 2. Respiration
 - 3. Autotrophic vs. heterotrophic
 - 4. Enzymes
 - 5. Energy utilization
 - 6. Energy transfer
- E. Control systems
 - 1. Hormones
 - 2. Neural control
 - 3. Genes
- F. Growth, Development and Reproduction
 - 1. Cell cycle
 - 2. Cellular reproduction
 - 3. Organismic reproduction
 - 4. Organismic development
 - 5. Cancer
- G. Heredity
 - 1. History
 - 2. Mendelian genetics
 - 3. Non-Mendelian inheritance
 - 4. Population genetics
- H. Evolution
 - 1. History and evidence for evolution
 - 2. Genetic basis of evolution
 - 3. Characteristics of evolution
 - 4. Origin and evolution of man
- I. Ecology and conservation
 - 1. Ecology and conservation compared
 - 2. Principles of ecology
 - 3. Symbiosis
 - 4. Contemporary issues in conservation of natural resources
 - 5. Ecosystems and communities
 - 6. Trophic levels, food chains and food webs
 - 7. Invasive and endangered species
- J. Molecular Biology
 - 1. DNA structure and replication
 - 2. Gene Expression
 - 3. Biotechnology

VI. METHODS OF INSTRUCTION:

- A. **Field Trips** -
- B. **Student Presentations** -
- C. **Written exercises and case studies** -
- D. **Lecture** -
- E. **Discussion** -
- F. **Audio-visual Activity** -
- G. **Lab** -

VII. TYPICAL ASSIGNMENTS:

- A. Reading, writing, and Discussion
 - 1. Read the relevant pages in your textbook on how carbon moves through ecosystems and view the following YouTube short video <https://www.youtube.com/watch?v=kxPwbhFeZSw>.
 - a. Define and explain the following terms: Carbon dioxide, bicarbonate, carbonate, carbon cycle, greenhouse effect, global climate change.
 - b. Bring your write-ups to class and be prepared to answer questions during class discussion.
- B. Role playing
 - 1. Review the lecture on blood cells, and read the corresponding pages in the textbook.
 - a. Now find at least one reputable source on the Internet to add some additional information.
 - b. With your partner, do a 2 minute skit on "my life as a little red blood cell".
- C. Literature Review and Reading
 - 1. Read "Sex Redefined" by Claire Ainsworth, published in Nature, Vol 518, 2015.
 - a. Write down some of the key concepts and be prepared to discuss the paper in class.

VIII. EVALUATION:

A. **Methods**

- 1. Exams/Tests
- 2. Quizzes
- 3. Papers
- 4. Oral Presentation
- 5. Group Projects
- 6. Home Work
- 7. Other:
 - a. Laboratory reports

B. **Frequency**

- 1. Testing
 - a. Quizzes: at the discretion of the teacher.
 - b. Midterm exams: A minimum of two per semester
 - c. Final exam: 1 per semester
- 2. Short paper: 1 per semester
- 3. Oral presentation: 1 per semester
- 4. Group projects: 1 per semester
- 5. Laboratory reports: at least 1 every two week
- 6. Homework: weekly

IX. TYPICAL TEXTS:

1. Starr, Cecie, Christine Evers, and Lisa Starr. *Biology: Concepts and Applications*. 10th ed., Brooks/Cole - Cengage Learning, 2018.
2. Taylor, Martha, Eric Simon, Jean Dickey, Kelly Hogan, and Jane Reece. *Campbell Biology: Concepts & Connections*. 9th ed., Pearson, 2017.
3. Jean L. Dickey. Laboratory Investigations for Biology. Pearson , 2003.
4. Perry, J. W., Morton, D., Perry, J. B.. Laboratory Manual for Non-Majors Biology. Brooks/Cole - Cengage Learning , 2013.

X. OTHER MATERIALS REQUIRED OF STUDENTS: