BIO 10 Course Outline as of Spring 2004

CATALOG INFORMATION

Dept and Nbr: BIO 10 Title: INTRO PRIN BIOLOGY
Full Title: Introduction to Principles of Biology
Last Reviewed: 1/28/2019

Units		Course Hours per Week		Nbr of Weeks	Course Hours Total	
Maximum	4.00	Lecture Scheduled	3.00	17.5	Lecture Scheduled	52.50
Minimum	4.00	Lab Scheduled	3.00	1	Lab Scheduled	52.50
		Contact DHR	0		Contact DHR	0
		Contact Total	6.00		Contact Total	105.00
		Non-contact DHR	0		Non-contact DHR	0

Total Out of Class Hours: 105.00 Total Student Learning Hours: 210.00

Title 5 Category:	AA Degree Applicable
Grading:	Grade or P/NP
Repeatability:	00 - Two Repeats if Grade was D, F, NC, or NP
Also Listed As:	
Formerly:	

Catalog Description:
Introductory course in biology including: scientific method, ecology, bio diversity, physiology and anatomy, chemistry of life, cell and molecular biology, genetics, and evolution. Meets general education laboratory science requirement.

Prerequisites/Corequisites:

Recommended Preparation:
Eligibility for ENGL 100 or ESL 100.

Limits on Enrollment:

Schedule of Classes Information:
Description: Introductory course in biology including: scientific method, ecology, bio diversity, physiology and anatomy, chemistry of life, cell and molecular biology, genetics, and evolution. Meets general education laboratory science requirement. (Grade or P/NP)
Prerequisites/Corequisites:
Recommended: Eligibility for ENGL 100 or ESL 100.
Limits on Enrollment:

Transfer Credit: CSU;UC.
Repeatability: Two Repeats if Grade was D, F, NC, or NP

ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:

AS Degree:	**Area**		Effective:	Inactive:
	C	Natural Sciences	Fall 1981	
CSU GE:	**Transfer Area**		Effective:	Inactive:
	B2	Life Science	Fall 1981	
	B3	Laboratory Activity		
IGETC:	**Transfer Area**		Effective:	Inactive:
	5B	Biological Sciences	Fall 1981	
	5C	Fulfills Lab Requirement		

CSU Transfer:	Transferable	Effective:	Fall 1981	Inactive:
UC Transfer:	Transferable	Effective:	Fall 1981	Inactive:

CID:

Certificate/Major Applicable:
Not Certificate/Major Applicable

COURSE CONTENT

Outcomes and Objectives:
Upon completion of this course, student will:
1. Apply the steps in the scientific method of hypotheses, experiments, data collection and theories, as well as the use of statistics.
2. Recognize and name the major levels of biological organization from atoms and cells to ecosystems and biomes.
3. Relate abiotic factors to the distribution of world biomes.
4. Explain how ecosystems are structured through energy flow, material cycles (i.e., water, carbon and nitrogen), and various trophic levels.
5. Evaluate species interactions to distinguish mutualism, predation, parasitism, herbivory, commensalism, and competition, including coevolution.
6. Describe how population density, dispersal, and growth are limited by environmental and intrinsic factors and apply these concepts to human populations.
7. Examine successional change in communities and the underlying causes.
8. Compare and contrast the nutrient acquisition, gas exchange, and internal transport mechanisms of plants and animals.
9. Differentiate the identifying characteristics and representatives of the major Domains and Kingdoms of organisms.
10. Summarize the structure of atoms, molecules, biological polymers and their significance to cell structure and function, anatomy, physiology, genetics and evolution.
11. Compare and contrast the cell structures, ultrastructures, membranes, and membrane transport and the functions of these structures and interactions found in prokaryotic, eukaryotic, plant and animal cells.

12. Synthesize knowledge of enzyme reactions with cellular functions, metabolism, photosynthesis, cell respiration and organismal function.
13. Compare and contrast methods of cellular reproduction (mitosis, meiosis and binary fission) and their significance.
14. Explain how DNA codes for proteins, how the code is translated by the cell, and the relationship to scientific traits and inheritance.
15. Synthesize knowledge of the mechanisms of evolution, adaptation, and speciation.
16. Relate the principles of genetics to the processes of evolution.
17. Describe the values, themes, methods and history of the discipline and identify realistic career objectives related to a course of study in the major.

Topics and Scope:

1. Methods and philosophies of science
   a. Steps in scientific method to laboratory experiments
   b. Statistics in hypothesis testing
   c. Hypothesis and theories
2. Biological Hierarchy: Discuss levels of biological organization from atoms and cells to the biosphere
3. Introduction to the Biosphere and major world biomes
4. Ecology of Ecosystems: Nutrient cycles (water, carbon, nitrogen), energy flow, trophic structure
5. Populations
   a. Structure (density, dispersion, age structure)
   b. Function (exponential, logistic growth)
   c. Human populations
   d. Population fluctuations
   e. Factors affecting carrying capacity
   f. Density dependent/density independent
   g. Limiting factors
6. Ecology of Communities: Interspecific species interactions, coevolution, succession
7. Types of Nutrition
   a. Autotrophic and heterotrophic
   b. Surface to volume ratio
   c. Macromolecules, vitamins, and minerals
8. Comparative Physiology of
   a. Microorganisms, plants, animals
   b. Positive and negative feedback loops
9. Plant Structure and Function
   a. Root, stem and leaf anatomy
   b. Nutrition, gas exchange, transport (transpiration and phloem sap)
   c. Plant reproduction
10. Comparative Animal Structure and Function of Different Animal Taxa: Nutrition and digestion, gas exchange, transport
11. Classification of Living Things
   a. Prokaryotes vs. eukaryotes
   b. Domain system, eukaryotic kingdoms
12. Diversity of Eukaryotic Kingdoms
   a. Distinguishing characteristics

b. Specialization of structure and function
c. Ecology and evolution

13. Atomic Structures
    a. Chemical bonding (ionic, covalent, hydrogen bonds)
    b. pH
14. Properties of Water
    a. Polarity and hydrogen bonding, cohesion and adhesion
    b. States of matter
    c. Osmosis and diffusion
15. Macromolecule Structure and Function
    a. Dehydration synthesis and hydrolysis
    b. Carbohydrates, lipids, proteins, nucleic acids
16. Cell structure and ultrastructure
    a. Prokaryotic and eukaryotic cell structure
    b. Cell organelles and their functions
    c. Cell cytoskeleton and movement
    d. Endosymbiotic hypothesis
17. Cell membrane structure and transport
    a. Phospholipids bilayer
    b. Membrane proteins
    c. Passive and active transport, endocytosis and exocytosis
18. Enzymes
    a. Structure and function
    b. Positive and negative feedback loops
    c. Effect of substrate concentration, pH and temperature
19. Metabolic Pathways
    a. Photosynthesis
        1) Properties of light and photopigments
        2) Substrate, products, and location of Light Dependent and Light Independent Reactions
    b. Respiration
        1) Role of ATP
        2) Substrate, products, and location of Glycolysis, Krebs Cycle and Electron Transport Chain
        3) Aerobic vs. anaerobic respiration
20. Cellular Reproduction
    a. Mitosis
    b. Meiosis including sources of genetic variation
21. Molecular Genetics
    a. DNA replication
    b. Protein synthesis, genetic code
    c. Mutations and mutagens
    d. Changes in chromosome number and chromosome structure
22. Transmission Genetics
    a. Mendelian: monohybrid crosses
    b. Post Mendelian Genetics: partial dominance, blood type (multiple alleles), polygenic inheritance, autosomal linkage, sex linkage
    c. Effects of environment on genetic expression
23. Contributions to Evolutionary Theory
    a. Lamarck
    b. Darwin and Natural Selection
24. Evidence for Evolution

a. Comparative anatomy and physiology
b. Molecular biology

25. Mechanisms of Evolution
    a. Natural Selection, types of selection, gene flow
    b. Genetic drift: bottlenecks, founders effect, small population, inbreeding
26. Biological Species Concept and Reproductive Isolation Mechanisms
27. Speciation and Adaptive Radiation
28. Use and care of compound and dissecting microscopes
29. Orientation to the values, themes, methods and history of the discipline and identification of realistic career objectives related to a course of study in the major.

Assignment:

1. Assigned reading from texts and other assigned reading.
2. Lab reports and/or essay assignments.
3. Scientific method of analysis and interpretation of data.
4. Assigned homework from laboratory or lecture assignments.
5. Objective examinations including: multiple choice and/or short essay lecture exams and short answer laboratory exams.
6. Demonstrate basic skill and handling of the microscope.

Methods of Evaluation/Basis of Grade:

Writing: Assessment tools that demonstrate writing skills and/or require students to select, organize and explain ideas in writing.

Written homework, Lab reports or essays	Writing 5 - 10%

Problem Solving: Assessment tools, other than exams, that demonstrate competence in computational or non-computational problem solving skills.

Homework/genetic probs, sci. meth. & analysis data	Problem solving 2 - 10%

Skill Demonstrations: All skill-based and physical demonstrations used for assessment purposes including skill performance exams.

Use and care of microscopes	Skill Demonstrations 2 - 5%

Exams: All forms of formal testing, other than skill performance exams.

Multiple choice, Short answer and/or essay, lab exams (required)	Exams 65 - 80%

Other: Includes any assessment tools that do not logically fit into the above categories.

Class participation	Other Category 0 - 10%

Representative Textbooks and Materials:
BIOLOGY, CONCEPTS AND APPLICATIONS, 5th Edition, by C. Starr, 2003.
BIOLOGY, CONCEPTS AND CONNECTIONS, 4th Edition, by Campbell, Reece Mitchell, and Taylor, 2003.