BIO 10 Course Outline as of Summer 2019

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	8	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, biodiversity, physiology and anatomy, chemistry of life, cell and molecular biology, genetics, and evolution.

Prerequisites/Corequisites:
Completion of MATH 150A or MATH 150 or higher (MATH) or qualifying placement

Recommended Preparation:

Limits on Enrollment:

Schedule of Classes Information:
Description: Introductory course in biology including: scientific method, ecology, biodiversity, physiology and anatomy, chemistry of life, cell and molecular biology, genetics, and evolution. (Grade or P/NP)
Prerequisites/Corequisites: Completion of MATH 150A or MATH 150 or higher (MATH) or qualifying placement
Recommended:
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:
Both Certificate and Major Applicable

COURSE CONTENT

Student Learning Outcomes:
At the conclusion of this course, the student should be able to:
1. Explain the core concepts of biology (evolution and adaptation, structure and function, systems and biology, flow of information, flow of energy and matter) as they apply to appropriate topics of cell and molecular biology, organismal biology, genetics, evolution and ecology.
2. Integrate related core concepts.
3. Demonstrate skill in core competencies.

Objectives:
During this course, student will:
1. Discuss relationship and connections between the five core concepts.
2. Evaluate how evidence for evolution relates to the scientific process and be able to construct an argument to counter common evolution misconceptions.
3. Apply the core concept of evolution and adaptation to all course content, cell and molecular biology, genetics, organismal, and ecology.
4. Integrate microevolutionary mechanisms with macroevolution.
5. Correlate the structure and function of plant and animal organ systems, organs, tissues and cells.
6. Compare and contrast the cell structure and function of prokaryotic and eukaryotic cells and of plant and animal cells.
7. Integrate concepts of diffusion and osmosis with cell membrane structure and mechanisms of transport.
8. Explain the relationships between the structure of atoms, molecules, and biological polymers, and their significance to cells, physiology, genetics, and evolution.
9. Integrate knowledge of molecular genetics, inheritance, and cell division (mitosis and

meiosis), and apply these to evolutionary biology.
10. Apply understanding of negative feedback loops at the cellular and physiological level.
11. Integrate concepts of molecular, cellular, physiological, and ecological energy flow and nutrient cycling.
12. Apply knowledge of ecological principles to current ecological problems.
13. Integrate different levels of the biological hierarchy and examine emergent properties.
14. Test ideas with evidence, applying the scientific process to biological investigation including data analysis and interpretation.
15. Evaluate evidence as part of a scientific community.
16. Apply laboratory techniques, including proper microscope use, to observe and experiment with biological phenomena.

Topics and Scope:

I. Evolution and Adaptation
- A. Evolution and taxonomy: macroevolution and biodiversity including biological species, reproductive isolation mechanisms, and speciation (optional topics may include adaptive radiation, cladistics and analysis of evolutionary relationships)
- B. Evolution theory: Mechanisms of evolution (natural selection/adaptation, gene flow, mutation, genetic drift, sexual selection), evidence for evolution, evolution misconceptions

II. Structure and Function
- A. Cell and molecular: atomic structures and chemical bonding, water chemistry*, organic molecules, protein structure/function, enzymes*, membrane structure and function*, cell structures of prokaryotes and eukaryotes*
- B. Plant: anatomy and physiology (structure and function of cells and tissue types*, transpiration and translocation, plant growth and development)
- C. Animal: anatomy and physiology* (three of the following organ systems: digestive, respiratory, circulatory, immune, reproductive)

III. Information Flow, Exchange, and Storage
- A. Molecular genetics: transcription, translation, gene expression, mutations and mutagens
- B. Inheritance: mitosis*, meiosis*, Mendelian*, post-Mendelian
- C. Negative feedback loops: molecular, cellular and physiological

IV. Pathways and Transformations of Energy and Matter
- A. Cell and molecular biology: photosynthesis, cell respiration, enzyme pathways
- B. Ecosystems: nutrient cycles (water, carbon, nitrogen), energy flow through ecosystems

V. Systems Biology/Emergent Properties
- A. Biological hierarchy
- B. Population ecology: growth and regulation, human populations
- C. Community ecology*: niches, species interactions and co-evolution, succession

VI. Core Competencies
- A. Science as a process*: exploration and discovery, testing ideas with evidence, peer review, relationship between science and society
- B. Compound and dissecting microscope use*

*These sections are covered in the lab portions of the course.

Assignment:

Lecture-Related Assignments:
1. Exams, including short answer and free response questions (3-5)
2. Assigned reading (approximately 25 pages/week)
3. Homework assignments (0-15), including genetic problems
4. Essay assignments (0-4) 2-4 pages each

Lab-Related Assignments:
1. Laboratory exercises and/or reports: scientific method of analysis and interpretation of data (8-20)
2. Microscope skills quiz (1)
3. Laboratory exams (2-3)

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.

Lab reports or essay assignments	Writing 5 - 10%

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

Homework assignments; laboratory exercises	Problem solving 2 - 10%

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

Microscope skills quiz	Skill Demonstrations 1 - 5%

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

Lecture and lab exams	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:
Campbell Biology, Concepts and Connections. 9th ed. Taylor, Martha and Simon, Eric and Dickey Jean. Pearson. 2018
Concepts of Biology. Fowler, Samantha and Roush, Rebecca and Wise, James. OpenStax. 2016
Instructor prepared lab manual