**BIO 10 Course Outline as of Fall 2013**

# CATALOG INFORMATION

Dept and Nbr: BIO 10 Title: INTRO PRIN BIOLOGY
Full Title: Introduction to Principles of Biology
Last Reviewed: 2/10/2025

| 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

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| 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 higher (V1) or Qualifying Test Score in Math and Course Completion of ENGL 100 (or ENGL 100X or ESL 100 or ENGL 309) or higher (V8) or ESL 100 or Qualifying Test Score in English

**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 higher (V1) or Qualifying Test Score in Math and Course Completion of ENGL 100 (or ENGL 100X or ESL 100 or ENGL 309) or

higher (V8) or ESL 100 or Qualifying Test Score in English
Recommended:
Limits on Enrollment:
Transfer Credit: CSU;UC.
Repeatability: Two Repeats if Grade was D, F, NC, or NP

## ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:

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|---|---|---|---|---|
| **AS Degree:** | **Area** | | Effective: | Inactive: |
| | C | Natural Sciences | Fall 2025 | |
| | L5 | Physical and Biological Sciences | | |
| | C | Natural Sciences | Fall 1981 | Fall 2025 |
| **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 | | |

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| **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

**Outcomes and Objectives:**
Upon completion of this course, student will be able to:
1. Apply the scientific method to biological investigation.
2. Apply laboratory techniques, including proper microscope use, to observing and experimenting with biological phenomena.
3. Describe the role of biotic and/or abiotic factors to structuring biomes, ecosystems, communities, and populations, and how humans interact with these systems.
4. Correlate the structure and function of plant and animal organ systems, organs, tissues and cells.
5. Compare and contrast the cell structure and function of prokaryotic and eukaryotic cells and of plant and animal cells.
6. Explain the relationships between the structure of atoms, molecules, and biological polymers, and their significance to cells, physiology, genetics, and evolution.
7. Integrate knowledge of molecular genetics, inheritance, and cell division (mitosis and meiosis), and apply these to evolutionary biology.
8. Relate the mechanisms of evolution, adaptation, and speciation.
9. Recognize major evolutionary patterns and adaptations in the biodiversity of major taxa (domains, kingdoms, and phyla).
10. Describe the values, themes, methods, and history of biology and relate them to a course of study in the major.

**Topics and Scope:**

1. Methods and philosophies of science
   A. Steps of the scientific method in laboratory experiments
   B. Sample size and statistical methods in testing hypotheses
2. Biological Organization: atoms to the biosphere
3. Ecology
   A. Introduction to the biosphere and major world biomes
   B. Ecosystems: nutrient cycles (water, carbon, nitrogen), energy flow, trophic structure
   C. Communities: niches, species interactions (resource partitioning, keystone species), co-evolution, succession
   D. Populations: structure, growth and regulation, human populations
4. Physiology
   A. Nutrition (autotrophic and heterotrophic), macromolecules, vitamins, and minerals
   B. Plant structure and function: nutrition, gas exchange, transport, and reproduction
   C. Comparative animal structure and function: nutrition and digestion, gas exchange, transport
   D. Surface to volume ratio
5. Classification and diversity of taxa: domain system, eukaryotic kingdoms and select phyla
   A. Distinguishing characteristics
   B. Specialization of structure and function
   C. Ecology and evolution
6. Chemistry
   A. Atomic structures and chemical bonding
   B. Properties of water (polarity and hydrogen bonding, cohesion and adhesion)
   C. States of matter
   D. pH
   E. Macromolecule synthesis, structure and function (carbohydrates, lipids, proteins, nucleic acids)
7. Cell Biology
   A. Prokaryotic and eukaryotic cell structure and function (organelles, cytoskeleton)
   B. Endosymbiotic hypothesis
   C. Cell membrane structure
   D. Transport: diffusion, osmosis, passive and active transport, endocytosis, and exocytosis
8. Metabolic Pathways
   A. Enzyme: structure and function
   B. Enzyme activity: effects of pH and temperature, positive and negative feedback loops
   C. Photosynthesis light and photopigments
   D. Photosynthesis (light-dependent and light-independent reactions): substrates, products, and location
   E. ATP synthesis using chemiosmosis
   F. Aerobic vs. anaerobic respiration
   G. Respiration (glycolysis, Krebs cycle, and electron transport chain): substrates, products, and location
9. Cellular Reproduction
   A. Mitosis
   B. Meiosis including sources of genetic variation
10. Molecular Genetics
   A. DNA replication
   B. Protein synthesis and genetic code
   C. Mutations and mutagens

D. Changes in chromosome number and chromosome structure
11. Transmission Genetics
A. Mendelian Genetics
B. Post Mendelian Genetics: partial dominance, multiple alleles, polygenic inheritance, autosomal linkage, sex linkage
C. Effects of environment on genetic expression
12. Development of Evolutionary Theory
A. Pre-Darwinian thought: static world view to Lamarckian evolution
B. Darwin and natural selection
C. Evidence for evolution
13. Mechanisms of Evolution
A. Microevolution: types of selection, gene flow, mutation, and genetic drift
B. Macroevolution: biological species, reproductive isolation mechanisms, speciation and adaptive radiation
14. The effect of past and current understanding of biological principles, topics, and methods on the human condition
15. Biology as a discipline
16. Laboratory Exercises
Compound and dissecting microscope use
Scientific method
Enzyme structure and function
Properties of water
Cell types and structures
Mitosis and meiosis
Mendelian genetics
Evolution
Eukaryotic biodiversity

**Assignment:**

1. Assigned reading from texts and other assigned reading (approximately 25 pages/week).
2. Lab reports and/or essay assignments (2-4 pages).
3. Scientific method of analysis and interpretation of data (laboratory excercises) (approximately 1 per week).
4. Laboratory and/or lecture homework assignments, including genetic problems (approximately 1 per week).
5. Objective examinations including: multiple choice, short answer and/or essay, lecture exams (4 midterms, 1 final) and short answer laboratory exams (2-3 exams)
6. Demonstrate basic microscope skills (microscope quiz) (1 per semester).

**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.

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| Lab reports or essay assignments | Writing<br>5 - 10% |

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

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| Homework assignments; laboratory exercises; genetics problems | Problem solving<br>2 - 10% |

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

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| Use and care of microscopes | Skill Demonstrations<br>2 - 5% |

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

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| Multiple choice, short answer and/or essay, lecture and lab exams (required) | Exams<br>65 - 80% |

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

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| Class participation | Other Category<br>0 - 10% |

**Representative Textbooks and Materials:**
Biology, Concepts and Connections, edition 7/e. Campbell, Reece, Taylor, Simon, Dickey. Pearson Benjamin Cummings: 2012.
Concepts of Biology, 2nd edition. Mader. McGraw-Hill: 2011.
Instructor prepared lab manual