**COURSE OUTLINE : BIOL 102**
**D Credit – Degree Applicable**
**COURSE ID 005073**
**Cyclical Review: February 2021**

**COURSE DISCIPLINE :** BIOL

**COURSE NUMBER :** 102

**COURSE TITLE (FULL) :** General Biology II

**COURSE TITLE (SHORT) :** General Biology II

**CALIFORNIA STATE UNIVERSITY SYSTEM C-ID :** BIOL 140 – Organismal Biology

**CCC ACADEMIC SENATE DISCIPLINE:** Biological Science

**CATALOG DESCRIPTION**

BIOL 102 provides a continuation of the study of fundamental biological processes introduced in Biology 101. The course includes the anatomy and physiology of plants and animals, animal development, population genetics, evolutionary theory, origin of life, ecological principles, conservation biology, and sytematics. The course also includes an extensive survey of biodiversity covering the evolution, anatomy and physiology of the major prokaryotic and eukaryotic phyla.

Total Lecture Units: 3.00

Total Laboratory Units: 2.00

**Total Course Units: 5.00**

Total Lecture Hours: 54.00

Total Laboratory Hours: 108.00

Total Laboratory Hours To Be Arranged: 0.00

**Total Contact Hours: 162.00**

**Total Out-of-Class Hours: 108.00**

Prerequisite: BIOL 101.

**ENTRY STANDARDS**

| | Subject | Number | Title | Description | Include |
|---|---|---|---|---|---|
| 1 | BIOL | 101 | General Biology | Identify the properties of lipids, carbohydrates, proteins, and nucleic acids; | Yes |
| 2 | BIOL | 101 | General Biology | describe the structure of prokaryotic and eukaryotic cells; | Yes |
| 3 | BIOL | 101 | General Biology | explain cell respiration and photosynthesis; | Yes |
| 4 | BIOL | 101 | General Biology | describe the relationships between meiosis and Mendelian genetics; | Yes |
| 5 | BIOL | 101 | General Biology | describe the processes of DNA replication, transcription, and translation; | Yes |
| 6 | BIOL | 101 | General Biology | explain the basic mechanisms of gene regulation in prokaryotes and eukaryotes. | Yes |
| 7 | BIOL | 101 | General Biology | demonstrate proper use of laboratory equipment including the microscope, spectrophotometer, and micropipettes; | Yes |
| 8 | BIOL | 101 | General Biology | demonstrate proficiency with data collection, analysis, and graphical representation. | Yes |

**EXIT STANDARDS**

1 Discuss the evolution of land plants from chlorophyte ancestors and their adaptations to a terrestrial existence;
2 describe the anatomy and physiology of vascular plants in relation to nutrition, transport, hormonal control, and reproduction;
3 describe the anatomy and physiology of the major organ systems of animals: respiratory, circulatory, digestive, nervous, reproductive, and excretory/osmoregulatory;
4 explain the basic principles of animal developmental biology;
5 describe the phylogenetics of the major phyla of living organisms;
6 explain the historical background leading to the development of the theory of evolution by natural selection;
7 explain the major principles of population genetics including Hardy-Weinberg equilibrium, natural selection, non-random mating, genetic drift, gene flow, and mutation;
8 discuss the evidence for both microevolution and macroevolution;
9 describe the historical background leading to our current ideas regarding the origin of life;
10 describe important ecological principles including population growth, competition, and predation, ecosystems, and island biogeography.

**STUDENT LEARNING OUTCOMES**

1 recognize, compare and explain the anatomy and physiology of the major organ systems of flowering plants.
2 recognize, compare and explain the anatomy and physiology of the major organ systems of vertebrates.
3 recognize, compare and explain the major conceptual foundations of evolutionary theory and ecology.
4 develop hypotheses of evolutionary relationships using cladistics, and be able to identify defining anatomical, evolutionary and ecological characteristics of all major groups of living organisms.

**COURSE CONTENT WITH INSTRUCTIONAL HOURS**

| | Description | Lecture | Lab | Total Hours |
|---|---|---|---|---|
| 1 | Anatomy and Physiology of Vascular Plants<br>• Vascular system and transport mechanisms<br>• Nutrition and growth<br>• Hormones<br>• Photoperiodism<br>• Reproduction | 10 | 0 | 10 |
| 2 | Anatomy and Physiology of Vertebrates<br>• Homeostasis Hormones<br>• Circulatory and respiratory systems<br>• Excretory and osmoregulatory systems<br>• Digestive systems<br>• Nervous systems<br>• Support and muscular systems<br>• Sensory systems<br>• Reproductive systems | 20 | 0 | 20 |
| 3 | Animal Development<br>• Processes of embryogenesis<br>• Cell potency, determination, and differentiation<br>• Cytoplasmic determinants and morphogens<br>• Induction, organogenesis, and apoptosis<br>• Homeotic genes<br>• Gametogenesis and fertilization<br>• Early cleavage and gastrulation | 2 | 0 | 2 |

| | | | | |
|---|---|---|---|---|
| 4 | Population Genetics<br><br>• Populations and gene pools<br>• Hardy-Weinberg model<br>• Genetic drift<br>• Gene flow<br>• Non-random mating<br>• Mutation | 4 | 0 | 4 |
| 5 | Evolutionary Theory<br><br>• Historical perspective leading to the theory of evolution by natural selection<br>• Modes of natural selection<br>• Sexual selection<br>• Origin and maintenance of variation<br>• Clines<br>• Micro versus macroevolution<br>• Species concepts<br>• Mechanisms of reproductive isolation<br>• Allopatric and sympatric speciation<br>• Polyploidy<br>• Resource partitioning<br>• Adaptive landscapes<br>• Hybrid zones<br>• The fossil record<br>• Gradualism versus punctuated equilibrium<br>• Mass extinctions and adaptive radiations<br>• Molecular clocks | 7 | 0 | 7 |
| 6 | Origin of Life<br><br>• Models of early abiotic Earth<br>• Polymerization in the early Earth<br>• Protobionts<br>• Origin of information molecules<br>• Panspermia | 3 | 0 | 3 |

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|---|---|---|---|---|
| 7 | Ecological Theory<br><br>• Structural levels - populations, communities, ecosystems<br>• Principles of demography<br>• Survivorship curves<br>• Semelparity versus iteroparity<br>• Population growth - logistic versus exponential<br>• Population density, K and r selected traits<br>• Disturbance, species diversity, and ecological succession<br>• Competition, symbiosis, and predation<br>• Niches and competitive exclusion<br>• Energy flow through ecosystems<br>• Net and gross primary productivity Island biogeography<br>• Man's impact on the environment | 8 | 0 | 8 |
| 8 | Lab Topics<br><br>• Phylogenetic systematics, introducing species concepts, the principles of hierarchical classification and exercises in cladistics methodology<br>• Prokaryote biodiversity and evolution<br>• An extensive survey of biodiversity including the phylogeny, anatomy, and physiology of the major eukaryotic phyla (including protists, algae, basal land plants, seed plants, fungi, and invertebrate animals)<br>• Vertebrate phylogeny, anatomy, and physiology, including dissections of a shark, frog, turtle, snake, pigeon, and fetal pig<br>• Vascular plant and vertebrate animal tissues<br>• Population genetics<br>• Ecology<br>• Conservation biology | 0 | 108 | 108 |
| | | | | **162** |

**OUT OF CLASS ASSIGNMENTS**

1 assigned reading from popular science articles and blogs (e.g., “The Erotic Endurance of Whale Hips” by Carl Zimmer, National Geographic Phenomena: The Loom);
2 written assignments based on research on a local native plant species or endangered animal, to be presented in lab;
3 homework problems in population genetics;
4 homework problems in constructing cladograms.

**METHODS OF EVALUATION**

1 lecture examinations (including multiple choice and essay questions);
2 laboratory practical examinations;
3 completion of a laboratory manual and pre-lab questions;
4 laboratory written assignments and presentations.

**METHODS OF INSTRUCTION**

- [x] Lecture
- [x] Laboratory
- [ ] Studio
- [ ] Discussion
- [x] Multimedia
- [ ] Tutorial
- [ ] Independent Study
- [x] Collaboratory Learning
- [x] Demonstration
- [x] Field Activities (Trips)
- [ ] Guest Speakers
- [x] Presentations

**TEXTBOOKS**

| Title | Type | Publisher | Edition | Medium | Author | IBSN | Date |
|---|---|---|---|---|---|---|---|
| Life: The Science of Biology | Required | W.H. Freeman | 12 | print | Hillis, David M., et al. | 978-1319307042 | 2020 |