

Prepared by the Department of Natural Sciences and Applied Technology

Date of Departmental Approval: February 15, 2017

Date Approved by Curriculum and Programs: February 22, 2017

Effective: Fall 2017

- 1. Course Number: BIO109 / BIO109 L**  
**Course Title: Survey of Biology / Survey of Biology Laboratory**
- 2. Description:** This is a survey course of biology, the study of life, in one semester. It is designed to conceptually and experimentally explore the processes that sustain life. Major topics include cell biology, adaptation and evolution, genetics and reproduction, ecology and diversity, taxonomy and classification. The course is not intended for science majors.
- 3. Student Learning Outcomes:** Upon successful completion of this course, students are able to do the following.
  - Explain the properties required for life by recognizing the levels of scientific organization
  - Classify the variety of life forms that have evolved
  - Assemble lab specimens into taxonomic groups according to comparative data
  - Utilize the Periodic Table of Elements to demonstrate atomic number and chemical bonding
  - Explain the importance of water to living processes and incorporate water into the concept of a pH scale
  - Differentiate between carbohydrates, lipids, proteins and nucleic acids as types of organic molecules.
  - Describe the role of enzymes in regulating metabolism
  - Explain the function of cellular organelles and the plasma membrane
  - Demonstrate concentration gradients, diffusion and osmosis as they apply to living cells
  - Use a variety of devices and instruments in taking laboratory measurements, such as a compound microscope to examine cells and cellular structures
  - Compare and contrast prokaryotic and eukaryotic cells using examples, habitats and components
  - Explain energy use in living organisms
  - Summarize the sequence of events whereby plants convert radiant energy into nutrient energy
  - Distinguish between the stages of mitosis in both plant and animal cells
  - Discuss the usefulness of cell division and the problems of unregulated mitotic growth
  - Compare and contrast an organism's genotype with phenotype to apply the link between DNA and the genetic code
  - Construct a Punnett Square and predict the genotypes and phenotypes of offspring Using basic principles of genetics
  - Associate genetic mutations with the process of adaptation and evolutionary change
  - Examine the phenomenon of speciation as a means to explore the diversity of organisms
  - Compare and contrast the multitude of microbial life forms according to their habitat, physical characteristics, energy use and lifestyle
  - State the ecological role of fungi in the natural world
  - Describe the physiological and reproductive adaptations developed by plants and animals as they colonized land
  - Use computer programs to create and analyze cladograms depicting the taxonomic relationships between groups of land plants
  - Use computer programs to create and analyze cladograms depicting the taxonomic relationships between groups of animals
  - Access website links for study assistance in understanding and visualizing complex scientific concepts
  - Use electronic media for practice, review and self-assessment
- 4. Credits:** 4 credits
- 5. Satisfies a General Education Requirement:** Natural or Physical Science
- 6. Prerequisites:** MAT020 (Prealgebra) or MAT025 (Pre-Algebra), ENL108 (Critical Reading & Thinking) or satisfactory basic skills assessment scores

7. **Semesters Offered:** Fall, Spring

8. **Suggested Guidelines for Evaluation:** Examinations, lab quizzes, and practicals.

9. **General Topical Outline:**

- I. **Biology as Science**  
Properties of Life  
Levels of Organization  
Classification  
Evolution  
Scientific Method
- II. **Chemistry**  
Atoms and the Periodic Table  
Importance of Water  
pH scale
- III. **Cell Biology**  
Cell diversity and habitat  
Cell structure and function  
Plasma membrane and Transport Mechanisms  
Prokaryotes vs. Eukaryotes
- IV. **Biochemistry**  
Carbohydrates, Lipids, Proteins, & Nucleic Acids  
Enzymes as Catalysts  
Energy Use  
Metabolism as a Cellular Process  
Photosynthesis and Cellular Respiration
- V. **Genetics and Heredity**  
Cell Division  
Genotype and Phenotype  
Dominant and Recessive Alleles  
Inheritance  
Mutations and Evolution
- VI. **Natural Selection**  
Origin of life  
Speciation and Diversity  
Genetic Drift and Natural Selection  
Divergent and Convergent Evolution
- VII. **Microbes**  
Bacteria, Viruses, Protists
- VII. **Plants and Fungi**  
Characteristics and Adaptations  
Diversity and Classification
- VIII. **Animal Diversity and Evolution**  
Characteristics and Adaptations  
Diversity and Classification