SPRINGFIELD TECHNICAL COMMUNITY COLLEGE

ACADEMIC AFFAIRS

Course Number: BIOL 102 Department: Biological Sciences

Course Title: Principles of Biology 1 Semester: Spring Year: 1997

Objectives/Competencies

Course Objective	Competencies
1. Summarize characteristics of life, and introduce the five kingdoms of living organisms.	1. List characteristics of life. 2. Name the 5 kingdoms of life. 3. Compare and contrast members of each kingdom. 4. Cite examples of members of each kingdom. 5. Learn fundamentals of taxonomic classification.
2. Learn the process of scientific investigation and discovery.	1. Summarize steps of scientific method. 2. Apply the use of the scientific method to activities of daily life.
3. Understand basic concepts of inorganic chemistry.	1. Diagram basic atomic structure. 2. Explain chemical formulas. 3. Learn types of chemical bonds. 4. Contrast oxidation-reduction reactions. 5. Summarize properties of water. 6. Distinguish between hydrophobic and hydrophilic molecules. 7. Distinguish between organic and inorganic compounds.

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	8. Contrast acids and bases, and describe action of buffers.
4. Understand basic concepts of organic chemistry.	1. Learn 4 groups of macromolecules – carbohydrates, fats, lipids, nucleic acids with respect to their chemical composition and functions. 2. Distinguish between monosaccharides, disaccharides, and polysaccharides. 3. Describe chemical structure and functions of proteins. 4. Learn the chemical structure of nucleotides and nucleic acids, and explain the importance of these compounds in living organisms.
5. Principles of cell structure and function.	1. Explain general characteristics of cells. 2. Describe the Cell Theory. 3. Distinguish between prokaryotic and eukaryotic cells. 4. Distinguish between plant and animal cells. 5. Learn the 3 major cell components. 6. Discuss the importance of cell membranes. 7. Describe the functioning of the cell membrane. 8. Define and describe the types of movements into and out of cells. 9. Understand functions of cellular organelles.
6. Understand concepts of energy flow and production within living organisms.	1. Distinguish between potential and kinetic energy, as well as substrates and products. 2. Understand differences between exergonic and endergonic reactions. 3. Know differences between catabolic and anabolic

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	reactions. 4. Realize the important role of enzymes as biological catalysts. 5. Learn basic concepts of enzyme functioning and factors that affect enzyme activity. 6. Learn First and Second Laws of Thermodynamics.
7. Learn basic concepts of mitosis and meiosis.	1. Understand the importance of cellular reproduction. 2. Identify the periods of the Cell Cycle and describe events of each. 3. Differentiate between plant cell division and animal cell division. 4. Distinguish between haploid and diploid cells. Define homologous chromosome. 5. Realize the significance of meiosis in sexual reproduction and spore formation. 6. Contrast mitosis and meiosis.
8. The study of DNA.	1. Learn a brief history of the discovery of DNA. 2. Explain how structure of DNA determines function. 3. Diagram the shape of DNA molecule. 4. Name the subunits of DNA, and the parts of each. 5. Describe base-pairing. Predict complimentary pairings. 6. Summarize process of DNA replication and role of DNA polymerase. 7. Explain how DNA is organized into chromosomes. 8. Understand the universality of the genetic code. 9. Understand how mutations affect cells.

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9. Study of RNA and protein synthesis.	1. Outline the flow of genetic information in cells from DNA to protein. 2. Compare DNA and RNA molecules. 3. Identify functions of the three types of RNA molecules. 4. Describe the role of ribosomes in protein synthesis.
10. Learn basic concepts of genetics.	1. Understand the significance of the gene. 2. Distinguish between genes and chromosomes, and genes and alleles. 3. Define: genotype, phenotype, dominant, recessive, homozygous heterozygous. 4. Solve simple problems involving monohybrid and dihybrid crosses and explain results. 5. Summarize Mendel's experiments.
11. Study of Kingdom Protista.	1. List characteristics of Protists. 2. Distinguish between plant-like protists and animal-like protists. 3. Describe representative phyla of the protozoans. 4. Understand the ecologic, economic and pathogenic significance of the protozoans. 5. Realize that ancient protists were ancestors of complex, multicellular plants and animals.
12. The Kingdom Animalia.	1. List characteristics common to all animals. 2. Learn characteristics, habitats, and lifestyles of members of specific phyla.

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	3. Understand patterns of body symmetry, body cavity type, and developmental patterns for each phylum. 4. Compare and contrast characteristics shared by members of each phylum. 5. Study lifecycles of selected phyla members. 6. Discuss economic and ecologic importance of each phylum. 7. Distinguish between invertebrate and vertebrate animals. 8. Learn basic body plan and distinguishing characteristics. 9. Know factors involved in the great biological success of arthropods. 10. List 4 distinguishing characteristics of all Chordates. 11. Characterize each of the 7 classes of vertebrates, and provide examples of members of each class.