

SCRANTON PREPARATORY SCHOOL



The biology program offers a balance between textual and investigative material. While stressing the conceptual development of themes in biology and providing insights into the thinking processes behind scientific discovery, this course places concepts in the unifying framework of evolutionary relationships. The textual areas include a study of molecular biology, genetics, evolution, and a survey of both plant and animal life, with stress on the human life form as a whole organism. These will be coupled with the investigation into a vastly changing field, including recombinant DNA technology, virology, and immunology. Each investigative lab will complement the material of the course content and will emphasize science's basic methods and logical approaches to asking questions and problem solving.

TEXT and LABORATORY MANUAL

Biology Concepts & Connections 4th Edition. Campbell, Reece, Mitchell, Taylor. Benjamin Cummings Publishing 2002.

Laboratory Biology Kaskel/Hummer/Kennedy/Oram Merrill Publishing Company, 1994

OBJECTIVES

The student, upon completion of the course, should show competence in following areas and will

- Demonstrate knowledge biological concepts in testing situations as well as in application to the reality of our present environment
- Understand and interpret the ever-increasing amount of information in the area of biological science
- Appreciate the fragile ecological balance of our environment and is able to make well informed and reasonable decisions in this area
- Demonstrate ability in the collection and interpretation of data in laboratory situations
- Develop and understand the place of technology in biological sciences and recognize the moral and ethical issues implied
- Demonstrate skill in the use of laboratory equipment

I. Biology as a science

- a. Characteristics of living things
 - i. Nature and composition of living things
 - ii. Tools of the biologist
- b. Chemistry needed to understand molecular biology
 - i. Composition and interactions of matter
 - ii. Nature and composition of living things
 - iii. Water as a foundation for chemical reactions
 - iv. Compounds of living things, organic and inorganic

II. Cellular structure as a basis for biological function

- a. Cell Theory
- b. Cellular structure and organelles
- c. Movement of materials in cellular activity

III. Cellular Energy

- a. Photosynthesis: light and dark reactions
- b. Glycolysis, respiration, and fermentations as use of energy
- c. Structure and process of nucleic acids
- d. DNA, RNA, and protein synthesis as foundation for biological function and genetics
- e. Cellular growth and reproduction: mitosis and meiosis

- IV. Genetics as a continuation of cellular process and life process
 - a. Historical work of Mendel as foundation for further understanding of genetics
 - b. Chromosome theory as it relates to basic concepts of genetics
 - c. Concept of mutations as process of genetics and evolution
 - d. Human heredity and inheritance of traits
 - e. Genetic disorders and diagnosis, use of karyotype
 - f. Genetic engineering, process and use of technology

- V. Diversity of living things
 - a. Evolution, evidence of change, evidence from fossils, and evidence from living things
 - b. Process of evolution through natural selection and genetics
 - c. Classification, historical background and present theory

- VI. Summary of plant and animal classification
 - a. Viruses and Monerans – typical structures and basic function
 - b. Plant-like and animal-like protists as they relate to evolutionary process
 - c. Mosses and ferns as a step up in evolution and alternation of generations
 - d. Basic concepts of roots, stems, and leaves in higher plants
 - e. Reproduction in seed plants, flowers and seeds
 - f. Comparative invertebrates and ties to evolution
 - g. Comparative vertebrates and ties to evolution

- VII. Human anatomy and physiology
 - a. Structure and function of:
 - i. Nervous system
 - ii. Skeletal system and musculature
 - iii. Digestive system and nutrition
 - iv. Circulatory and excretory systems and their interactions
 - v. Endocrine system
 - vi. Reproductive system and development
 - b. Human disease and immune system
 - i. Specific and nonspecific defenses
 - ii. Immune disorders

- VIII. Major experimental and/or research project designed by student to cover topics:
 - a. Ecological value
 - b. Population growth and communities
 - c. Water and soil pollution
 - d. Animal behaviors
 - e. Indoor or outdoor ecosystems

STUDENT EVALUATIONS

An integral part of any educational programs is evaluation of student performance. Realizing that not all students test well, other areas have been included as part of the evaluation program. Regular tests are administered reflecting cognitive recognition and comprehension, as well as application. Laboratory, projects, and discussion help supplement in areas of analysis of data, identification of relationships and judgments based on high moral and ethical Christian values. Ignatian pedagogy idealizes service to others as an extension of one's personal philosophy and spirituality. Discussion of current scientific advances as expressed in news media helps to bring students to the recognition of this important value.

- I. Major testing which include questions of knowledge, application of principles and concepts, graphic and data interpretation, and essays that measure ability to process information and relationships.
- II. Laboratory reports, as well as skill and technique in use of laboratory equipment.
- III. Quarterly projects, research or experimental.
- IV. Homework assignments and quizzes.
- V. Oral reports and classroom participation.
- VI. Mid-term and final examinations.