PETERS TOWNSHIP SCHOOL DISTRICT

CORE BODY OF KNOWLEDGE (CBK)

ADVANCED PLACEMENT BIOLOGY

GRADES 10, 11 & 12

For each of the sections that follow, students may be required to understand, apply, analyze, evaluate or create the particular concepts being taught.

COURSE DESCRIPTION

AP Biology Overview

Our Advanced Placement Biology curriculum is equivalent to a college course usually taken by biology majors during their first year of college. The course is comprised of a lecture and an extensive laboratory portion. The class meets 5 times per week for lecture, with 2 additional weekly laboratory periods. Labs take up about 25 percent of the instructional time.

Teaching Strategies

We attempt to follow the eight major themes from the AP Biology Course Description throughout the course. This also includes completion of the laboratory exercises recommended by this committee.

The primary emphasis of the course is on developing an understanding of concepts; a grasp of science as a process rather than as an accumulation of facts; personal experience in scientific inquiry; recognition of unifying themes that integrate the major topics of biology; and the application of biological knowledge and critical thinking to environmental and social concerns.

Topics covered in the course include chemistry of life, cells and cell energetics, heredity, molecular genetics, evolution, diversity of organisms, structure and function of both plants and animals, and ecology. The course is broken down into three areas of study: 25% molecules and cells, 25% genetics and evolution, and 50% organisms and populations.

Goals

- To enhance problem-solving skills of students using hands-on labs, reading, and class discussions.
- To familiarize students with the terminology and concepts of Biology using a theme-oriented approach that emphasizes concepts and science as a process over knowledge of facts.
- To strengthen student's communication skills with the use of written assignments, essays, and lab reports.
- To prepare students for further study in the Biological Sciences.

Labs

Students are required to the complete the labs set forth by The College Board Advanced Placement Program. These lab activities focus on the development and testing of hypothesis; collection and analysis of data in such a way that stress biology as a process rather than an accumulation of facts. Within one week of completing a lab, students answer analysis questions and submit their lab manuals to the instructor for grading. Additional labs may include microscope techniques, DNA extraction, karyotype analysis, microorganisms, and dissections (invertebrate/vertebrate). For selected labs, students are required to turn in high quality, typed lab reports in the format provided by the instructor.

Student Evaluation: Students are evaluated on their performance on unit exams, weekly quizzes, lab reports and homework.

Weighting:
Exams (multiple-choice/essay) 65%
Quizzes 15%
Lab Reports/Lab Practicals 15%
Homework 5%

STUDY SKILLS

- Thoroughly complete structured study guides while reading the text for each section.
- Daily review of class notes in preparation for class.
- Participate in class discussions; ask and answer questions relating to content.
- Application of content in the laboratory setting.
- Complete online text activities and review in preparation for assessments.

MAJOR UNIT THEMES:

1. **BASIC BIOLOGICAL PRINCIPLES**
    - Scientific method
    - Major themes that link all forms of life
    - Characteristics of living things
    - Laboratory techniques

2. **CHEMICAL BASIS OF LIFE**

    - Structure of an atom
    - Types of chemical bonds
    - Functional groups
    - Properties of water
    - pH scale
    - Macromolecules: carbohydrates, lipids, proteins, nucleic acids
    - Enzymes
    - Biochemical reactions

3. CELLULAR STRUCTURE AND FUNCTION

- Cell theory
- Prokaryotic and eukaryotic cells
- Cell membranes and transport mechanisms
- Cell organelles: Structure and function
- Cell cycle and its regulation
- Mitosis in plants and animals

4. BIOENERGETICS (CELLULAR RESPIRATION AND PHOTOSYNTHESIS)

- Overview of aerobic and anaerobic respiration
- Structure and function of ATP
- Mitochondrion structure and function
- Molecules and reaction involved in cellular respiration
- Chloroplast structure and function
- Light dependent and light independent reaction(Calvin cycle)
- C_3 , C_4, and CAM plants
- Chemiosmosis in mitochondria and chloroplasts

5. HEREDITY

- Meiosis and gametogenesis
- Eukaryotic chromosomes
- Mendel's experiments and Punnett squares
- Inheritance patterns
- Human genetics

6. MOLECULAR GENETICS

- RNA and DNA structure and function
- DNA replication
- Protein synthesis
- Mutations
- Viral structure and replication
- Nucleic acid technology and applications
- Genetic engineering

7. EVOLUTIONARY BIOLOGY

- Evolutionary scientists and their theories
- Natural selection
- Evolution of populations
- Evidence for evolution
- Mechanisms of evolution
- Early evolution of life
- Speciation

8. ORGANSIMS AND POPULATIONS

- Diversity of Organisms
- Evolutionary patterns
- Survey of the diversity of life
- Phylogenetic classification
- Evolutionary relationships

9. ECOLOGY

- Levels of organization
- Energy flow through an ecosystem
- Abiotic/biotic factors
- Cycling of matter
- Biodiversity
- Biomes
- Population dynamics
- Communities and ecosystems
- Global issues

10. COMPARATIVE ANATOMY AND PHYSIOLOGY

- Animal form and function
- Homeostasis
- Immune system
- Nervous system
- Endocrine system
- Other systems (optional)

MATERIALS (and Supplemental materials used in course):

- Campbell Biology AP 9th ed. by Campbell, Reece, Urry, et al; Benjamin/Cummings Publishing, 2011.
- AP Test Prep Series AP Biology by Holtzclaw and Holtzclaw; Benjamin/Cummings Publishing Co. Inc., 2013.
- AP Biology Investigative Labs: An Inquiry-Based Approach, The College Board, 2012.
- www.masteringbiology.com (a subscription website with interactive units and science updates.)

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