

2007 - 2008 General Biology

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Textbook: Biology (Johnson and Raven)

Course Description

Welcome to Biology! Biology at ISPS is a college preparatory course that seeks to develop in students, an awareness, understanding and appreciation of themselves and the world in which they live. They will learn basic chemical processes at the cellular level and expand this to encompass ecosystems. The unit on genetics encompasses the study of nucleic acids (DNA and RNA), protein synthesis, cell growth and sexual reproduction. These studies of cellular and molecular genetics are followed up with the principles of heredity, including Mendelian genetics, mutations and Darwinian evolution. A large emphasis is placed on hot topics like Genetic Engineering and Biotechnology including the Human Genome project, Gene Therapy and Cloning. The course also includes a unit on Human Biology.

Throughout the course, students will practice Scientific Method as an approach to problem solving and analysis. Concept mapping is an integral technique used in this course. I look forward to working with your children this year and once they are committed to learn, this class will be an interesting and rewarding one for them!

Course requirements/ Grading

This is a rough outline of the grading. Depending on the number of tests, write ups etc these percentages are subject to change each term.

1. Participation-10%
 - within class
 - outside class-field trips
 - in laboratory
2. Homework/ daily assignments-15%
3. Project/ group work-15%
4. Lab write ups-10%
5. Major tests-40%
6. Quizzes-10%

Homework

Students will have nightly homework. This may include, reading and concept mapping a particular topic, answering questions from the text or assigned from a different source. They may be required to read an article or complete a lab write up. Whatever the nature of the homework if it is not completed it will get an automatic 0. Homework accounts for 15% of the grade. Homework given for the next period should not exceed 20 -30 minutes. If you find that your child is spending more time than this **consistently**, please inform me so that we can work together and address this problem.

Lab work

A lab write up is expected for all labs performed. This may be simply filling out sheets or typing a more extensive lab report. Guidelines for this type of lab will be given on completion of the first lab.

Projects

Each quarter, a project will be assigned. *Some* class time will be given but students will also be expected to spend time outside the class to complete this. They may be asked to work individually or with other students depending on the project.

Tests and quizzes.

Students will be given very regular short quizzes. This is to help familiarize them with some of the difficult terms. If they perform well on these quizzes, it will help them with the more elaborate tests at the end of the chapters or units.

Course outline

The following topics will be covered this year, some in more depth than others.

The Science of Life (Ch.1)

- Problems with defining life
- Common themes in biology
- Characteristics of life

Scientific Method (Ch 1)

- Designing an experiment: control, constant, independent/ dependent variables
- Hypothesis formation/ predictions
- Testing hypotheses

Chemistry and Biochemistry (Ch 2)

- Atomic structure: Protons, neutrons, electrons, atomic number/ atomic mass, isotope, ions
- Ionic vs. covalent bonding
- Properties and importance of water
- Structure and function of macromolecules: carbohydrates, lipids, proteins, nucleic acids

Cell Biology (Ch 3)

- Cell theory
- Cell organelles
(mitochondria, chloroplast, centrioles, golgi apparatus, ribosomes, endoplasmic reticulum, nucleus, nucleolus, lysosomes, vacuoles)
- Differences between prokaryotic/ eukaryotic cells and plant / animal cells
- Organization: cells, tissues, organs, organ systems

Microscopy: (Ch 3)

- Parts of a microscope
- Determining total magnification

Cell transport and plasma membrane (Ch 3,4)

- Structure of plasma membrane (fluid mosaic model)
- Movement across the membrane: diffusion, osmosis, facilitated diffusion, active transport, endocytosis, exocytosis
- Hypotonic, hypertonic, isotonic solutions and direction of flow of solutes

Photosynthesis (Ch 5)

- Importance of process
- Light vs. dark reactions (Calvin cycle)

Cellular Respiration (Ch 5)

- Importance of process
- Overview of Glycolysis, Krebs Cycle, E.T.C
- Aerobic vs. anaerobic respiration, fermentation

Cell Division (Ch 6, 7)

- Cell cycle
- Mitosis: purpose and steps
- Meiosis: purpose and steps
- Similarities and differences between meiosis and mitosis

Genetics (Ch 8)

- Gregor Mendel and his pea plants
- Dominant vs. recessive, homozygous vs. heterozygous, allele vs. gene, phenotype vs. genotype
- Monohybrid and dihybrid crosses
- Complete, incomplete, and co-dominance
- Sex linked traits
- Pedigrees
- Human genetic disorders

DNA (Ch 9, 10)

- Structure and function
- Replication of DNA, transcription, translation
- Protein synthesis
- Mutations

Genetic Engineering (Ch 11)

- Recombinant DNA
- Transgenic organisms
- DNA fingerprinting
- Human Genome Project
- Genetic Engineering
- Cloning and stem cell issues (ethics)

Evolution (Ch 12, 13, 32)

- Origin of Life (Miller and Urey, Oparin's hypothesis)
- Darwin's contributions
- Theory of Natural Selection
- Evidence of Evolution
- Alternative views (creationism etc)
- Human evolution
- Early homonid species

Human Body

The structure and function of aspects of each of the following:

- nervous and endocrine system (including the effect of drugs on these systems)
- respiratory, circulatory and lymphatic systems (and how they interact)
- the immune system
- digestive and excretory systems
- reproductive system

Students will complete dissections of various animal body parts during the course of this unit.

Ecology

- Levels of organization
- Population control and limiting factors
- Predation, parasitism, competition, commensalism, mutualisms
- Food chains vs. food webs, energy pyramids
- Mans impact on the environment and organisms

