

2009 – 2010 General Biology

Course Instructor: Maeve O Donovan (email: modonovan@isps.edu.tt)

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