

Biology

Topics covered:

The chemistry of living things

The biological importance of weak interactions. Organic molecules in organisms and their respective functions. The role of enzymes.

The cell as the basis of life

Cell theory. Cell size. Prokaryotic and eukaryotic cells, animal and plant cells. Viruses.

The structure and function of the cell membrane and transport across the membrane. Cellular structures and their specific functions. Cell cycle and cell division: mitosis and meiosis - chromosomes and chromosome maps.

Bioenergetics

The energy currency of cells: ATP. Redox reactions in living things. Photosynthesis, glycolysis, aerobic respiration and fermentation.

Reproduction and Inheritance

Life cycles. Sexual and asexual reproduction. Mendelian genetics: Mendel's laws and their applications. Classical genetics: chromosomal theory of inheritance - inheritance patterns. Molecular genetics: structure and replication of DNA, the genetic code, protein synthesis. Prokaryotic DNA. Eukaryotic chromosome structure. Genes and regulation of gene expression.

Human genetics: mono- and multifactorial character transmission; hereditary diseases - autosomal and linked to chromosome X.

Biotechnology: recombinant DNA technology and its applications.

Inheritance and environment

Mutations. Natural and artificial selection. Evolutionary theories. The genetic basis of evolution.

Anatomy and physiology of animals and humans

The animal tissues. Anatomy and physiology of systems in humans and their interactions. Homeostasis.