

Biology

General Biology:

- division and definition of biological sciences,
- average ratio of most important elements, and small molecules in living organisms,
- composition, synthesis, function and importance of basic macromolecules (nucleic acids, proteins, lipids and polysaccharides)
- basic properties of life in animals and plants (composition from cells, growth and development, response to stimuli, reproduction, adaptation),
- metabolism, anabolism and catabolism, photosynthesis,
- reproduction of multicellular organisms (sexual and asexual-vegetative), exclusions (e.g. parthenogenesis and neoteny),
- individual development of an individual - basic phases (from origin of gamets to death)

The cell:

- a cell as a basic structural, functional and reproductive unit of living organisms,
- structure of a cell (plasma membrane, cytosol, cytoskeleton, organelle, nucleus),
- function of organelles, their function in metabolisms of plants and animals,
- basic characteristics of metabolism in the cell, enzymes,
- differences and common characteristics of prokaryotic and eukaryotic cells,
- cell cycle and division of the cell (mitosis and its phases, interphase),
- meiosis and origin of gametes,
- chromosomal pool of body cell and gamet,
- basic tissues of animals and humans, structure and function

Microbiology and Immunology:

- viruses (structure, size and shape, types, reproduction in the cell, examples of diseases, AIDS),
- bacteria (structure, size and shape, types, reproduction in the cell, examples of diseases), disinfection and pasteurisation,
- parasites and parasitism (e.g. parasitic protozoa) defensive mechanisms of an organism (inborn and acquired immunity, active and passive immunity), phagocytosis, antigen and antibody

Animals:

- overview of taxonomy, examples (e.g. Cestodes, Annelida, Arthropoda and Amphibia),
- convergence and diversity of traits,
- bases of comparative physiology of animals and humans

Molecular biology:

- composition and structure of DNA and RNA, complementarity of bases, genetic code,
- basic kinds of genes, their function,
- transcription and translation, synthesis of proteins,
- organisation of nuclear and extranuclear DNA and RNA, complementarity of bases, genetic code,
- basic kinds of genes, their function,
- transcription and translation, synthesis of proteins,
- organisation of nuclear and extranuclear DNA, plasmides,
- diseases caused by disorders in the structure of DNA - enzymopathies - examples and consequences

Genetics:

- methods of genetic research - experimental breeding, genealogy (pedigrees) and gemellology (traits in twins),
- basic terms (gene-locus, allele, genotype, phenotype, homozygote, heterozygote, Mendelian laws, monohybridism (single-gene and dihybridism) inheritance of blood groups AB0 and Rh.
- eukaryotic chromosomes, characteristics, number, chromosomal determination of sex (gonosomes, X-linked genes),
- set of chromosomes, haploid (n) and diploid (2n),
- X-linked recessive diseases (haemophilia A and colour blindness - daltonism),
- gene mutations, chromosomes and genome,
- aneuploidy and polyploidy

Humans:

- blood and tissue fluid (composition and function),
- skeleton - main parts (bones of skull, trunk and extremities), connections,
- heart and vessels (pulmonary and systemic circulation), structure, function and blood supply and action of the heart muscle,
- respiratory system - composition, function, characteristics,

- gastrointestinal system, composition, digestion and resorption of nutrients caused by lack of vitamins, control of vegetative functions.
- endocrine glands, overview of hormones and their action and importance for metabolism and control of organism, signs and diseases caused by lack or surplus of certain hormones,
- sense organs, structure and function,
- brain and spinal cord, structure and function, importance of brain parts,
- sexual glands, origin of gametes, fertilisation, development of the embryo and fetus,
- excretory system, structure and function of the kidney