1. Cells and their function –

a. Cell structure – name and function of cellular organelles
b. Protein synthesis and degradation – Transcription and translation, cellular localization, function of DNA and RNA in the protein synthesis, mechanism of protein degradation – lysosomes and proteasomes
c. Cell division (mitosis, meiosis) –
d. Movement of materials cross the cell membrane – diffusion, osmosis, filtration, active transport, phagocytosis and pinocytosis
e. Cells and cancer – mutations and major risk factors of cancer

2. Heredity and Hereditary diseases

a. Genes and Chromosomes – structure, karyotype, localization and distribution to offspring
b. Functions of genes –
    Recessive and dominant genes
    Sex-linked traits
    Sex determination
    Factors influencing gene expression
c. Chromosome/gene mutations and genetic diseases – e.g. Down syndrome, Turner syndrome, Klinefelter syndrome, Color blindness, Hemophilia
d. Mitochondrial Inheritance

3. Direct and indirect causes of disease

a. Basis of infection and inflammation (examples of the most common diseases)
b. Methods of destroying pathogens or of inhibiting their growth
c. Vitamin deficiency and Malnutrition
d. Addictions – their consequences and preventing methods

4. Integumentary system - structure of the skin, its appendages, function, diseases

5. Skeletal system

a. Bones – their cells, formation, structure and function
b. Axial vs. appendicular skeleton – e.g. bones of the upper limb, lower limb, thorax
c. Joints - classification and structure
d. Effects of aging on skeletal system – e.g. osteoporosis

6. Muscular system

a. General characteristic of skeletal muscles, cardiac muscle and smooth muscle
b. The mechanism of skeletal muscle contraction
c. Muscle metabolism

7. Nervous system

a. Nervous tissue – cells, nerves, synapses, conduction of the nerve impulse, reflex arc
b. Division of the nervous system – characteristic features of central, peripheral, somatic and autonomic nervous system
    Brain and spinal cord – structure, function, coverings (including CSF), diseases e.g.

Alzheimer disease, Parkinson disease
Cranial nerves (CN I-XII) and spinal nerves
Sympathetic and parasympathetic nervous system – parts and function in body

c. Homeostasis

8. Sensory system

a. Eye – its protective structures (incl. lacrimal apparatus), coats of the eyeball, muscles and nerves, the most common disorders and defects (e.g. myopia, astigmatism, glaucoma)
Ray of light pathway – refracting parts and sensory receptors
b. Ear – division, function (hearing and equilibrium) and disorders
c. Taste and smell – receptors and organs
d. General senses – touch, position, pressure, temperature, pain

9. Hormones and endocrine system

a. Hormones – chemical categories, methods of action, regulation, involvement in stress response
b. Endocrine glands (pituitary, thyroid, parathyroid, adrenal, pancreas, sex glands, thymus and pineal) and their hormones – control role of hypothalamus and endocrine system disorders e.g. diabetes, normal value of the blood sugar
c. Other hormone producing organs (kidney, stomach, placenta)

10. Blood

a. General characteristic and purposes of blood
b. Blood plasma and its function
c. Formed elements of blood – RBC, WBC, platelets - their structure and function, normal value of the blood cells in the blood. Origin of blood cells
d. Problems of transfusions – blood typing (AB antigens, Rh factor)
e. Hemostasis and blood clotting (factors and process)

11. Cardiovascular system

a. General structure of the heart wall and its coverings
Anatomy of the heart, coronary vessels
Conduction system of the heart
Cardiac cycle
b. Blood vessels – arteries and veins structure and function
Pulmonary and systemic circulations
Hepatic portal system
Normal value and measurement units of heart rate (pulse) and blood pressure

12. Lymphatic system, body defenses

a. Anatomy and function of lymphatic system - vessels and structures containing lymphoid tissue
b. Role of the mononuclear phagocyte system
c. Nonspecific and specific defenses against invasion
d. Vaccines and immunization

e. Disorders involving the immune system
    Allergy
    Transplant and rejection syndrome
    Immune deficiency – AIDS

13. Respiratory system

a. Anatomy and functions of the respiratory system elements
b. Pulmonary ventilation – stages, principals of inhalation and exhalation
c. Oxygen and carbon dioxide transport
d. External and internal respiration – general features and regulatory mechanisms

14. Digestive system, Nutrition, Metabolism, Body temperature

a. Anatomy and functions of digestive tract elements
b. Accessory organs and their functions
c. Digestion – enzymes and other substances needed (place of production and their chemical characteristic)
    Hormonal and nervous control of digestion
d. Absorption
e. Disorders of digestive system – e.g. stomach ulcers
f. Anabolism vs. catabolism
g. Principals of nutrition – minerals and vitamins, essential amino- and fatty acids
h. Body temperature – normal range and control function of hypothalamus

15. Urinary system

a. Anatomy and functions of urinary system elements
b. Function of the kidney
    Structure of nephron – glomerular filtration, tubular reabsorption and secretion
    Urine – normal constituents, urine concentration (ADH role)
    Renin-Angiotensin- Aldosterone (RAA) system; Erythropoietin (EPO)
c. Regulation of body fluids
    Electrolytes- major ions (anions and cations) Na, K, Ca, Mg, bicarbonate, Cl, phosphate
    Acid-base balance, pH measurement

16. Reproductive system

a. Gonads and formation of male and female germ cells
b. Anatomy and function of female reproductive tract
    Menstrual cycle – hormones, phases
c. Anatomy and function of male reproductive tract
d. Pregnancy – fertilization, embryogenesis, function of placenta