Topics for preparation
for Entrance Exams in Biology and Chemistry for applicants
at the Faculty of Medicine of the Slovak Medical University in Bratislava

General Medicine – English Programme

1. **Metabolism** - anabolic processes, catabolic processes; exergonic reactions, endergonic reactions; assimilation; biological oxidation, ATP
2. **Chemical composition of the cell,** carbohydrates, fats, proteins, nucleic acids
3. **Cell,** cell organelles; transport across the membrane; cell cycle, mitosis, meiosis, oogenesis, spermiogenesis, zygote, differentiation, embryo, fetus
4. **Nucleic acids,** DNA, RNA, replication, transcription, translation
5. **Inheritance and Genetic**, gene, allele, phenotype, genotype , heritability genetic diseases, population genetics, Hardy-Weinberg's law, examples
6. Blood groups, examples of blood groups, Rh factor
7. **Matter, pure substances, mixtures; atom, its structure and quantum description,** electron configuration, ionization energy, electron affinity, nuclides, isotopes, radioactivity; **periodic system** (groups, periods, ...); **chemical bonds,** bond energy, activation energy
8. **Kinetics of chemical reactions; thermodynamics of chem. reactions** (heat of reaction, exothermic/endothermic reactions, entropy, enthalpy, Gibbs energy, exergonic/ endergonic reactions); **equilibrium state of chem. reactions**
9. **Periodic table of elements - s elements, p elements, d elements; hydrides; halides; oxides**
10. **Inorganic acids, bases, salts, proteolytic reactions, pH; electrolytes**
11. **Redox reactions, oxidation numbers; precipitation reactions, solubility product**
12. **Biogenic elements; C** (electron configuration, hybridization, types of bonds, ...), **org. compounds** (description, classification, types of formulas in organic chemistry, cleavages, reagents in organic chemistry, induction and mesomeric effect, types of reactions in organic chemistry, isomerism); **alkanes, alkenes, alkynes, alkadienes, cycloalkanes; arenes; heterocycles**
13. **Halogen derivatives; nitro compounds; amines; diazonium salts; alkaloids; hydroxy derivatives (alcohols, phenols); carbonyl compounds (aldehydes, ketones); carboxylic acids and carboxylic acid derivatives**
14. **Saccharides** (composition, classification, properties, anomers, esterification and glycoside bond, redox reactions, reactions/tests for presence of sacch., reducing / non-reducing carbohydrates, ...)

15. **Lipids** (functions, groups, their properties and composition, formation, acylglycerols, fatty acids, hydrogenation of unsaturated fatty acids, cholesterol, bile acids, terpenes, steroid hormones, waxes, soaps, phospholipids, lipoproteins, ...)

16. **Amino acids** (composition, acidic/basic/neutral character, essential/non-essential, formation of non-essential, characteristic reactions, peptide bond, pI and formation of anion/cation/amphion, ...); **Proteins** (composition, structure, occurrence, denaturation); **Enzymes** (composition, classification and their functions, specificity, rate of enzyme reaction, activation/inhibition of enzyme, ...)

17. **Nucleic acids** (composition, structure, transcription, translation, codons, ...)

18. **Vitamins** (definition, classification, names, structure, effects, ...)

19. **Diffusion, osmosis, osmolarity, osmotic pressure, saline solution**

20. **Metabolic pathways** (definition, types, Krebs cycle, glycolysis, alcoholic fermentation, ..), **electron transport chain/terminal oxidation, macroergic compounds, acetyl-CoA** (formation, precursor of what, ..)

21. **Calculation exercises:** moles, mass, standard molar volume of ideal gas, mass and molar concentration and fraction, stoichiometry, mixing equations, crystallization, ΔH, pH calculation; solubility product, equilibrium constant, osmolarity, osmotic pressure