Subject: MEDICAL CHEMISTRY
Study year: 1
Study program: General Medicine

**Aim of course**

The subject Medical Chemistry includes selected chapters from general, inorganic, physical, organic and bioorganic chemistry. Teaching is placed to the 1st semester of the study at Medical Faculty of UPJŠ. Knowledge of the structure and function of chemical substances and compounds, as well as their interaction and factors which can influence these interactions is very important for incoming doctors. The chapters from Medical Chemistry represent the basis for the study of Medical Biochemistry, Patobiochemistry, Patophysiology, Clinical Biochemistry, and many others specialized subjects of the medical studies.

**Education:** lectures and practical excercises

**Assesment:** written tests and exam

**Syllabus**


Classification of chemical reactions. Chemical thermodynamics, thermodynamics terms, the heat of reaction, internal energy, enthalpy, Hess’s law, entropy, free energy, the direction of chemical reactions. Reaction kinetics, dependence of the reaction rate on the concentration, temperature and the presence of the catalyst. Chemical equilibrium, Guldberg-Waage law, equilibrium constant, Le Chatelier’s principle.

Oxidatio-reduction reactions, electrodes, electrode potential. The biological aspects of oxidatio-reduction reactions. Macroergic bonds and compounds, energetically coupled reactions, the general features of the cell metabolism.

Saccharides - structure and biological function. Biologically important mono- and disaccharides, their reactions and biological functions. Polysaccharides: homopolysaccharides (e.g. starch, glycogen, cellulose, dextran, inulin), heteropolysaccharides (proteoglycans, glycoproteins, GAG) – structure and biomedical importance.


Nucleic acids (NA): composition, structure, classification, biological importance. The structure of purine and pyrimidine bases. Biochemically important nucleotides, nucleosides. Genetic code. Diagnostically importance of the bases derivates (e.g. 5-fluorodeoxyuridylate). Methods for isolation, detection and utilization of NA for diagnostic purpose.

Vitamins: classification, structure, chemical properties and biological importance. Terpenes, alkaloids and flavonoids: structure, properties, biological importance and medical application.


Biological membranes, membrane proteins, fluidity of membranes. Types of membrane transport (e.g. passive and facilitated diffusion, active transport, endocytosis, exocytosis).

The calculation in Medical Chemistry – e.g. stoichiometric, pH, spectrophotometric calculations, concentration/dilution solutions.

Volumetric analytical methods - classification, acid-base titration, acid-base indicators, redox titration and indicators, complexometry, precipitation reactions and solubility product, principles of spectrophotometry and its practical application. Chromatographic methods and their application. The principles of proof and determination of selected chemical compound (according practical exercises).