

Subject: <b>BIOORGANIC CHEMISTRY</b>	Subject type:	<b>elective</b>
Study year: <b>1</b>	Content:	<b>1/1 summer term</b>
Study program: <b>General Medicine</b>		

## Aim of the course

The graduate knows the structures and functions of selected organic and bioorganic molecules that participate in chemical processes taking place in living systems, which leads to a better understanding of the functions of the whole organism. Bioorganic chemistry is the chemical basis for mastering and properly understanding medical biochemistry, which is its superstructure and also forms the theoretical basis of several medical disciplines.

**Education:** lectures/seminars

**Assessment:** written tests, finished written work assignment

## Syllabus

### Biochemically important organic compounds

*Hydroxy derivatives* of hydrocarbons, their biological and medical significance. Oxo compounds: classification and nomenclature, characteristic properties of medically important aldehydes and ketones and their reactions.

*Carboxylic acids* and their substitution and functional derivatives: properties and structure, specific reactions, biochemical significance. Organic derivatives of carbonic acid (e.g. carbamic acid, urea, guanidine, creatine, creatinine, barbituric acid).

*Organic nitrogen compounds:* amines, nitro compounds and their biological significance. Organic derivatives of phosphorus and sulfur: structure, medical and toxicological significance.

*Heterocyclic compounds:* structure and properties of five-membered (e.g. furan, pyrrole, thiophene, pyrazole, imidazole, thiazole and their derivatives) and six-membered heterocycles (e.g. pyran, pyridine, pyrimidine and their derivatives). Heterocyclic compounds with fused heterocycles (e.g. derivatives of purine, pteridine, aloxazine) and their biochemical and medical significance (e.g. amino acids, coenzymes, drugs, dyes).

### Bioorganic compounds

*Saccharides* (monosaccharides, disaccharides, polysaccharides): structure, function, biochemical significance. Significant reactions of monosaccharides – oxidation, reduction, aldol condensation. Properties of complex saccharides (e.g. proteoglycans, GAGs, glycolipids) and their biological significance.

*Fatty acids*, triacylglycerols, sphingolipids: structure, function, biochemical significance. Compound lipids (e.g. phospholipids, glycolipids, lipoproteins) and their function and significance. Derived lipids (e.g. terpenes, cholesterol) – composition, biological significance.

*Amino acids* – structure, isoelectric point, properties, peptide bond. Medically important *peptides* (e.g. vasopressin, oxytocin) and *proteins* (e.g. collagen, elastin). Complex proteins (e.g. blood plasma proteins): structure and significance.

*Nucleic acids* (DNA and RNA): structure, function, hydrolysis. Nitrogen bases: nucleosides, nucleotides (structure, meaning).

*Natural substances* (e.g. vitamins, alkaloids): structure, biochemical and medical significance.