UNIVERSITY OF NOVI SAD
FACULTY OF MEDICINE

Study program: Integrated Academic Studies in Medicine

Course title: Chemistry in Medicine

Teacher: Slobodan B. Gadžurić, Jasna M. Adamov, Tatjana N. Ćebović

Course status: compulsory

ECTS Credits: 8

Condition:

Course aim

- to provide wide and balanced theoretical knowledge of chemistry and the chemical structure of molecules applied in modern medicine;
- to enable students to understand chemical reactions and processes in the human body.

Expected outcome of the course:

After successfully completing the course the student is able to:

- demonstrates acquired knowledge of chemical principles and reactions necessary for the functioning of the human body;
- lists biologically important elements, ions and biomolecules included in processes in human cells;
- correctly interprets the connection between the structure and activity of simple and complex molecules widely applied in medicine;
- independently analyzes and applies chemical trends in medicine.

Course description

Theoretical education

Atomic theories, chemical bonds, intermolecular forces. Radioisotopes. Water structure, hydrogen bonds, hydrophobic interactions. Solutions, solubility, diffusion, dialysis, osmosis, osmodiuretics. Acids and bases. pH and buffer systems in the human body. Redox reactions in a living organism. Rate of chemical reactions and chemical equilibria in a living organism. Influence of concentration, pH, ionic strength and temperature on the rate of a chemical reaction. Molecular basis of life - biologically important elements, ions and biomolecules. Organic compounds in medicine. Isomerism, functional groups and reactivity of organic molecules. Heterocyclic compounds in medicine. Relationship between structure and activity of major organic molecules and pharmaceuticals. Chemistry of carbohydrates, lipids and steroids. Amino acids and proteins. Nucleotides and nucleic acids. Vitamins. Amphiphilic biologically active molecules. Fundamentals of thermodynamics of the human organism. Molecular modeling of medically important molecules and pharmaceuticals. Correlation between physicochemical properties and biological activity of molecules. Toxicity of inorganic and organic compounds.

Practical education

Theoretical exercises: Quantitative expression of solution composition. Colligative properties of the solution. Acid-base equilibria: calculation of pH in aqueous solutions of acids, bases and buffers. Salt hydrolysis. Chemical reaction rate. Molecular modeling.
Laboratory exercises: Measurement of mass and volume. Preparation of a solution of a certain concentration. Demonstration of diffusion and osmosis processes. pH measurement. Preparation of buffer solution. Reactions of functional groups of organic compounds. Reactions of biomolecules.

Literature

Compulsory

1. Weekly teaching load provided by lecturers
1. Fundamentals of Medicinal Chemistry, Gareth Thomas, University of Portsmouth, UK, 2003, John Wiley & Sons Ltd.
2. Medicinal Chemistry - A Molecular and Biochemical Approach, 3rd Edition, Thomas Nogrady and Donald F. Weaver, 2005, Oxford University Press, Inc.
3. Principles of Organic Medicinal Chemistry, R.R. Nadendla, India, 2005, New Age International (P) Ltd.

Number of active classes	**Theoretical classes:** 45	**Practical classes:** 30

Teaching methods: theoretical classes, practical classes, seminars, consultations

Student activity assessment (maximally 100 points)

Pre-exam activities	**points**	**Final exam**	**points**
Practical work	10	Written exam	60*
Tests	60	Oral exam	30

*Passed tests replace the written part of the exam.