UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

SYLLABUS DEL CORSO

Chemistry and Propaedeutic Biochemistry I

1718-1-H4102D001-H4102D001M

Aims

In the first part of the course will be illustrated: the principles of chemical kinetics, chemical equilibrium, redox reactions and energy related to them in the general framework of thermodynamics and electrochemistry, and finally the self-ionization of water will be treated, acid / base properties and buffer solutions.

In the second part will be described: the reactivity of the main classes of organic compounds, including the isomerism and the stereoisomerism of organic molecules containing carbon atoms. The properties of the main classes of macromolecules of biological interest (proteins, lipids, carbohydrates and nucleic acids) will be illustrated. In addition, the basic knowledge of proteomics and imaging with MS used for clinical applications will be provided.

Contents

The Biochemical Chemistry and Propedeutic module is oriented to provide the fundamentals of general and bioorganic chemistry. meeting the requirements of the medical sciences. It is proposed to offer useful knowledge for better understanding of other chemistry-related disciplines, such as biology and biochemistry.

Detailed program

General chemistry

Reactions and chemical balance; redox reactions; kinetics and thermodynamics (delta H and G) and spontaneity of a reaction

Acids, bases and buffer solutions; Henderson-Hasselback equation; pH of a buffer solution

Principles of electrochemistry

Bio-organic chemistry

Classification of organic compounds: Definition of functional groups; Structure, nomenclature and chemical-

physical properties of organic compounds.
Alkanes and halogen derivatives: reactivity and nucleophilic substitution;
Alcohols, thio alcohols and amines: chemical properties and reactivity;
Alkenes and aromatic hydrocarbons: the double bond and its reactivity;
Carbonyl compounds: chemical reactions of aldehydes and ketones;
Carboxylic acids: acidity and reactivity of carboxylic acids; carboxylic acid derivatives: esters, thioesters, amides, anhydrides.
Main classes of molecules of biological interest
Lipids: structure and reactivity
Carbohydrates: structure, stereochemistry and the reactivity of monosaccharides / disaccharides; the loop closure mechanism of a non-cyclic carbohydrate; polysaccharides.
Nucleosides, nucleotides and nucleic acids: structure and properties of nucleosides and nucleotides
Amino acids and proteins: classification and nomenclature of amino acids; the amide bond and its chemical properties; protein structure.
Basic knowledge of clinical proteomics and imaging with MS

Prerequisites

Basic knowledge of chemistry

Teaching form

Conventional

Textbook and teaching resource

Physical Chemistry, Adkins & Paula;
Organic Chemistry, Clayden et al,

Semester

1st semester

Assessment method

Written test

Final vote

Office hours

On appointment