UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Chimica e Propedeutica Biochimica

1819-1-H4601D069-H4601D002M

Aims

CHEMISTRY AND PROPAEDEUTICS BIOCHEMISTRY

The student should be able to:

• indicate the factors which affect the kinetics of chemical reactions and define their role; define the activation energy in chemical reactions and explain the significance of chemical equilibrium

• define the concept and properties of enzyme, coenzyme and substrate in relation to the catalytic processes

• explain the principles of thermodynamics, define the concepts of work, kinetic and potential energy, and their relationship; describe the elements of electrochemical necessary to the study of bioenergetics

• define the concept of acid, basic, salt and amphoteric electrolyte

• define the concept of pH and its significance in relation to biological processes, describe the properties of the buffer systems, measure the pH of a solution

• indicate the characteristics of aldehydes and ketones, carboxylic acids and their derivatives, polyfunctional compounds

• identify the structural and chemical properties of the major classes of organic compounds

• define the biological significance and interest of the "isomerism" inorganic compounds

• identify the characteristics of alcohols, phenols, thiols, ethers and thioethers

• describe the mechanism of addition reactions, substitution and oxidation-reduction applied to biological reactions

• describe the chemical characteristics of organic compounds of biological interest: lipids, carbohydrates, amines and nitrogen compounds, proteins and nucleotides

• describe the composition and structure of nucleic acids and explain the composition and structure of proteins

Contents

The course aims to provide students with the essential theoretical knowledge derived from basic science and tools necessary for future study of the degree course in Dentistry.

Detailed program

CHEMISTRY AND PROPAEDEUTICS BIOCHEMISTRY

- Chemical equilibrium: condition of chemical equilibrium, equilibrium constants and factors that influence the equilibrium

- Chemical kinetics; rates of reactions, energy of activation and the effect of temperature on reaction rate.

- Catalysis: how to change the speed of chemical reactions; enzymatic catalysts and their activity and specificity

- Elements of electrochemistry: redox potential and spontaneity of redox reactions

- Elements of thermodynamics: state of a system, thermodynamic state functions and variables, thermodynamic processes, interpretation of the spontaneity of chemical reactions through the state functions (entropy, enthalpy, free energy); Spontaneity of equilibrium reactions

- Acid-base equilibria: definitions of acid and base, strength of acids and bases in water; approximate calculation of pH, acidity and basicity of salt solutions

- Buffers and their buffer capacity, blood buffer systems

- General properties of organic compounds: chemical and physical properties
- Structural isomerism and stereoisomerism, geometric isomers and optical isomers

- Structure of coordination compounds and their biological importance

- Structure and reactivity of organic compounds: hydrocarbons, alcohols, thioalcohols; Amine, Carbonyl compounds Carboxylic acids and carboxylic acid derivatives, polyfunctional compounds

- Compounds of biological interest: Lipids, Carbohydrates, Amino Acids, Nucleotides

- Biological Polymers: Polysaccharides, Peptides and Proteins, Nucleic Acids

Prerequisites

In order to standardize the basic knowledge of the class, the School of Medicine organizes lectures and tutorials in physics and chemistry preliminary to the course

Teaching form

Lectures and tutorials

It is required 70% course attendance

Textbook and teaching resource

A. Fiecchi, M. Galli Kienle, A. Scala Chimica e Propedeutica Biochimica Ed. Edi Ermes.

E. Santaniello, M. Alberghina, M. Coletta, S. Marini Principi di Chimica Generale e Organica Ed.PICCIN

F.A. Bettelheim, W.H.Brown, M.K. Campbell, S.O. Farrell Chimica e Propedeutica Biochimica EdiSES

Semester

First semester

Assessment method

No ongoing tests

The evaluation will consist of a written test that will be used to ascertain the level of knowledge and ability to understand the topics covered during the course and to be able to solve problems.

Therefore the student will have to answer:

3 Open Response Questions (also with numerical exercises)concerning the topics of general chemistry, organic chemistry, biological compounds and proteomics, respectively

10 Single-answer quiz with 5 answers, of which only one is correct

Oral examination on the evaluation of the teachers(discussion of the written test). The oral test will serve to clarify critical issues emerged from the written test and to verify the communication skills of the student and will focus on the topics covered by the written test

Office hours

By appointment (e-mail marina.delpuppo@unimib.it) at Building U28, I floor, tel. 02-6448 8204