UNIVERSITÀ DI PAVIA

Anno Accademico 2018/2019

ORGANIC CHEMISTRY

Enrollment year	2018/2019
Academic year	2018/2019
Regulations	DM270
Academic discipline	CHIM/06 (ORGANIC CHEMISTRY)
Department	DEPARTMENT OF ELECTRICAL,COMPUTER AND BIOMEDICAL ENGINEERING
Course	BIOENGINEERING
Curriculum	Bioingegneria delle cellule e dei tessuti
Year of study	1°
Period	1st semester (01/10/2018 - 18/01/2019)
ECTS	3
Lesson hours	23 lesson hours
Language	Italian
Activity type	WRITTEN AND ORAL TEST
Teacher	PASINI DARIO (titolare) - 3 ECTS
Prerequisites	Basic notions of General Chemistry are required.
Learning outcomes	The objective of this part of the course is to introduce the student to the principles of Organic Chemistry. The teaching module, temporally the first the student will encounter in the integrated course of Organic Chemistry and Biochemistry, has the purpose to give the students the basic knowledge for the understanding of the structure and reactivity of organic molecules, with which they will frequently deal with in the prosecution of their studies, both in the biological field and as biomaterials.
Course contents	The fundamental concepts of Organic Chemistry will be illustrated (structure and bonding, acidity and basicity, resonance, stereoisomery and chirality). The structure of the main classes of organic compounds (saturated and unsaturated hydrocarbons, aromatic compounds,

	alcohols and ethers, aldehydes and ketones, amines and carboxylic acids) will be presented, and their reactivity will be described considering the characteristic functional groups of each class. The main classes of biomolecules will be examined in terms of their structure: aminoacids and proteins, carbohydrates, nucleic acids. The program, enucleated in detail, is as follows: - Structure and bonding. Electronic structures of atoms. Lewis structures. Electronegativity and chemical bonds. Ionic, covalent and noncovalent bonds. Formal charge. Resonance. Functional groups. Bronsted-Lowry acids and bases. Lewis acids and bases. - Stereoisomery and chirality. Definitions. Stereocenters. The R,S system. Molecules with two or more stereocenters. Enantiomers and diastereoisomers. Optical activity. Polarized light. Racemic mixtures. Separation of enantiomers. - Types of organic reactions. Mechanisms, equilibrium, kinetics and free energy profiles. Radicalic and polar reactions. - Structure of alkanes. Constitutional isomerism and nomenclature. Conformation of alkanes and cycloalkanes. Unsaturated hydrocarbons. Structure and configuration of alkenes. Reactions of alkenes: electrophilic addition. Alkynes. - Alkyl halides. Nucleophilic substitution and elimination: mechanisms. - Aldehydes and ketones. Nucleophilic addition reactions. Acetals and emiacetals. - Benzene and aromaticity. Nomenclature. Energy of resonance of benzene. Aromatic electrophilic substitution. - Alcohols, phenols, ethers and thiols. Acidity and basicity. Reactions of alcohols and phenols. - Amines and carboxylic acids. Structure and properties. Reactions with acids and bases. Esterification of carboxylic acids. Aminoacids. Amide bond in polypeptides and proteins. - Carbohydrates. Monosaccharides. Structure and stereoisomerism. Mutarotations. Disaccharides and polysaccharides. - Structure of nucleosides and nucleotides.
Teaching methods	Lectures
Reccomended or required readings	Slides and other lecture material will be provided by the professor. The students may integrate the lecture material with one of the following recommended books: William H Brown - Thomas Poon. Introduzione alla Chimica Organica. EDISES. McMurry. Chimica organica: un approccio biologico. Zanichelli
Assessment methods	Oral exam
Further information	Oral exam
Sustainable development goals - Agenda 2030	$lbl_legenda_sviluppo_sostenibile