



UNIVERSITÀ DI PAVIA

Anno Accademico 2021/2022

CHEMISTRY

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| Anno immatricolazione | 2021/2022 |
| Anno offerta | 2021/2022 |
| Normativa | DM270 |
| SSD | BIO/10 (BIOCHIMICA) |
| Dipartimento | DIPARTIMENTO DI MEDICINA MOLECOLARE |
| Corso di studio | MEDICINA E CHIRURGIA (IN LINGUA INGLESE) |
| Curriculum | PERCORSO COMUNE |
| Anno di corso | 1° |
| Periodo didattico | Primo Semestre (04/10/2021 - 14/01/2022) |
| Crediti | 5 |
| Ore | 40 ore di attività frontale |
| Lingua insegnamento | English |
| Tipo esame | SCRITTO |
| Docente | GALLIANO MONICA - 1 CFU VIGLIO SIMONA - 2 CFU VISAI LIVIA - 2 CFU |
| Prerequisiti | A basic knowledge on Physics is required. |
| Obiettivi formativi | The aim of the Chemistry course is the knowledge of the chemical structure, the properties and the transformation of the different classes of substances (inorganic and organic) to understand the basic chemical properties and transformation of the molecules in living organisms. |
| Programma e contenuti | The course is held by 3 teachers: -General and Inorganic Chemistry (Prof Simona Viglio) Elements and compounds. Atoms and molecules (symbolic chemistry; molecular formulas). Periodic system of the elements and electronic configuration; element valence and oxidation state. Intramolecular bonds: nature and polarity; molecular shape (structural |

formulas). Intermolecular bonds. Inorganic compounds: binary compounds of hydrogen and compounds containing oxygen. Nomenclature of inorganic compounds. Electrolytes. Acid base reactions and formation of salts. Aggregation states of the matter: definition of the solid state and description of the different types of crystalline solids. Definition of the liquid states. Vapor pressure and surface tension. Definition of gaseous state. A brief presentation of ideal gases' laws and the kinetic molecular theory of ideal gases. Solutions: definition, different types and qualitative and quantitative characterization. Thermodynamical considerations on solubility. Colligative properties: depression of the vapor pressure of the solvent and osmotic pressure. Thermodynamical chemistry: how spontaneously large is the degree of conversion reactants to products? Enthalpy, entropy and free energy. Chemical equilibrium. Kinetics: Collision theory, steric requirements, energetic factor and influence of concentration and temperature. Activated complex theory and activation energy. Catalysis. Acid–base equilibria: Broensted and Lowry's theory on acids and bases. Self-ionization of water. Definition of pH. Calculation of pH in solutions containing strong acids, weak acids, strong bases, weak bases and salts. Buffers. Oxidations and reductions: spontaneity and redox potential; electrochemical series; electrochemical potential; Nernst equation.

- Organic chemistry (Prof Livia Visai)

Organic Stereochemistry. Functional groups: nomenclature, structure and reactions. Hydrocarbons - saturated aliphatic and cyclic hydrocarbons: alkanes and cycloalkanes; unsaturated and aromatic hydrocarbons: alkenes, alkynes, aromatics and aromatic heterocyclic compounds. Alcohols, phenols, thiols and ethers: oxidation and reduction reactions in living organisms. Aldehydes and ketones and their importance in the biological field. Carboxylic acids and their acyl derivatives: esters and anhydrides; high energy compounds such as phosphoesters and thioesters. Aliphatic amines, heterocyclic amines and amides; examples of neurotransmitters.

- Propedeutic biochemistry (Prof Monica Galliano)

Monosaccharides: stereoisomers and stereochemistry. Lipids: fatty acids, triglycerides, phospholipids. Proteins: alpha-amino acids, peptidic bond. Nucleotides: biological roles , nucleic acids.

Metodi didattici

Frontal lectures.

Testi di riferimento

Katherine J Denniston, Joseph J Topping and Robert L Caret. General, Organic & Biochemistry. 9th Ed. 2016. McGraw-Hill Higher Education.

Modalità verifica apprendimento

Multiple choice test including questions on stoichiometry and the theoretical aspects of general and organic chemistry and propedeutic biochemistry

Altre informazioni

The VISAI teacher has activated an e-mail address to which students can apply for her part of the course: visai.harvey@unipv.it

Obiettivi Agenda 2030 per lo sviluppo sostenibile

[\\$Ibl legenda sviluppo sostenibile](#)