

## GENERAL CHEMISTRY

| MODULE   | CONTENT   | YEAR | TERM   | CREDITS | TYPE |
|--|-----------|------|--|---------|------|
| I - Fundamentals   | Chemistry | 1    | 1  | 6       | FB   |
| <b>LECTURER(S)</b>   |           |      | <b>Postal address, telephone nº, e-mail address</b>  |         |      |
| <ul style="list-style-type: none"> <li>• María José Ruedas Rama: Part I (Groups C y E)</li> <li>• Ana Conejo García: Parte II (Group C)</li> <li>• Joaquín M<sup>a</sup> Campos Rosa: Part II (Group E)</li> </ul> |           |      | <p>Prof. María José Ruedas Rama<br/>Dpto. Físicoquímica, Second floor, Faculty of Pharmacy.<br/>Tel: +34 958 247887<br/>e-mail: <a href="mailto:mjruedas@ugr.es">mjruedas@ugr.es</a></p> <p>Prof. Ana Conejo García<br/>Dpto. Química Farmacéutica y Orgánica, Third floor, Faculty of Pharmacy.<br/>C/ Campus de Cartuja s/n 18071, Granada.<br/>Tel: +34 958 249583<br/>e-mail: <a href="mailto:aconejo@ugr.es">aconejo@ugr.es</a></p> <p>Prof. Joaquín M<sup>a</sup> Campos Rosa<br/>Dpto. Química Farmacéutica y Orgánica, Third floor, Faculty of Pharmacy.<br/>C/ Campus de Cartuja s/n 18071, Granada.<br/>Tel: +34 958 243850<br/>e-mail: <a href="mailto:jmcampos@ugr.es">jmcampos@ugr.es</a></p> |         |      |
| <b>DEGREE WITHIN WHICH THE SUBJECT IS TAUGHT</b>   |           |      | <b>TUTORSHIPS</b>  |         |      |
| <b>Human Nutrition and Dietetics</b>   |           |      | <p>MJRR: Monday from 11.30 to 13-30; Tuesday and Thursday from 12:00 to 14:00</p> <p>ACG: Monday, Wednesday and Friday from 9:30 to 11:30</p> <p>JMCR: Monday, Wednesday and Friday from 11:30 to 13:30</p>  |         |      |



**PREREQUISITES and/or RECOMMENDATIONS (if necessary)**

- Suitable knowledge of Chemistry, high-school level.
- Basic knowledge on mathematical operations (logarithmic and exponential functions, use of calculator, etc.).

**BRIEF ACCOUNT OF THE SUBJECT PROGRAMME (ACCORDING TO THE DEGREE ;??)****GENERAL AND PARTICULAR ABILITIES**

General: CG3, CG4, CG8, CG29  
Specific: CE1, CE10, CE11, CE13.

**OBJECTIVES (EXPRESSED IN TERMS OF EXPECTED RESULTS OF THE TEACHING PROGRAMME)****DETAILED SUBJECT SYLLABUS**

## LECTURES:

## PART I

- UNIT 1. **Structure, chemical bonds, and reactivity.** Basic principles. Ionic networks. Covalent bond. Metallic bond. Intermolecular forces and biological role. Chemical reactions. Limiting reagent. Reaction yield.
- UNIT 2. **Solutions.** Classification. Concentration. Intermolecular forces and solubility. Colligative properties and applications.
- UNIT 3. **Thermochemistry.** First law of Thermodynamics. Heat. Work. Internal energy. Enthalpy. Heat capacity. Enthalpy of physical changes. Reaction enthalpy. Determination of reaction enthalpy. Hess' law. Influence of the temperature on the reaction enthalpy. Food and energy resources.
- UNIT 4. **Equilibrium.** Spontaneous processes and equilibrium. Second law of Thermodynamics. Gibbs' free energy. Phase equilibrium and phase diagrams. Chemical equilibrium and law of mass action. Thermodynamic origin of the equilibrium constant. Le Chatelier's principle. Effect of pressure, concentration, and temperature on the equilibrium.
- UNIT 5. **Proton transfer reactions. Acid-base equilibria.** Strength of acids and bases. Dissociation constants. Water autoprotolysis. pH scale. pH determination in simple systems. Acid-base titrations. Buffers. Biological role of the acid-base equilibria.
- UNIT 6. **Electron transfer reactions. Redox equilibria.** Oxidation and reduction. Balancing redox reactions. Standard reduction potentials and equilibrium constant. Spontaneity and reaction direction. Applications and redox systems of biological importance. Antioxidants.

## PART II

- UNIT 7. **Introduction to Organic Chemistry:** Concept and evolution. Carbon-carbon and carbon-



heteroatom bonds. Intermolecular forces. Hydrocarbons: classification and nomenclature. Constitutional isomerism. Stereoisomerism.

- UNIT 8. **Functional Groups.** Classification of Organic Compounds. Nomenclature of functional groups. Concept of functional groups. Principal monovalent functional groups: alcohols, phenols, ethers and amines. Principal divalent functional groups: aldehydes, ketones and imines. Principal trivalent functional groups: acids, esters, amides and nitriles.
- UNIT 9. **Carbohydrates.** Overview of Carbohydrates. Classification and nomenclature. Acyclic and cyclic forms. Type of Representation: Fischer and Haworth. Reactivity of monosaccharides: oxidation, reduction, O- and N-glycosylation. Modification of monosaccharides: amino sugars and deoxy sugars. Classification of disaccharides. Main disaccharides. Oligo and polysaccharides.
- UNIT 10. **Lipids.** Overview of Lipids. Oils, fats and waxes. Phospholipids and sphingolipids. Structure of membrane lipids. Eicosanoids: arachidonic acid. Isoprene and Isoprenoids. Steroids.
- UNIT 11. **Amino acids, peptides and proteins.** Amino acids: Structure and classification. Properties synthesis and protection of amino acids. Peptides and proteins. Primary and secondary structures of proteins. Enzymes and cofactors.
- UNIT 12. **Vitamins.** Overview of vitamins. Hydro-soluble and liposoluble vitamins. Biological functions.

#### LABORATORY SESSIONS AND SEMINARS:

##### *Seminars*

- Problems solving

##### *Laboratory sessions*

- **Session 1. Introduction to laboratory. Solutions. Preparation of a buffer solution.**
- **Session 2. Acidity measurements of olive oil, milk, and vinegar.**
- **Session 3. Practical test: Acid - base titration.**
- **Session 4. Synthesis of Isoamyl acetate.**
- **Session 5. Synthesis of dibenzalacetone.**
- **Session 6. Hydrolysis of sucrose.**

#### READING

##### BASIC READINGS:

- **Chemical Principles.** 3<sup>a</sup>-5<sup>a</sup> Eds. P. Atkins, L. Jones.
- **General chemistry.** 10<sup>a</sup> Ed. R.H. Petrucci, F. G. Herring, J. D. Madura, C. Bissonnette.
- **Química Orgánica.** H. Hart, L. E. Crine, D. J. Hart y Ch. M. Hadad. Ed. McGraw Hill. 12<sup>a</sup> edición., 2007.
- **Química de los alimentos.** H. D. Belitz. Ed. Acribia, 2011.

##### COMPLEMENTARY READINGS:

- **General chemistry.** J. L. Rosenberg, L. M. Epstein.
- **Resolución de Problemas de Química.** A. Sánchez Coronilla.
- **Resolución de Problemas de Química General.** C. J. Willis.
- **Química. Un proyecto de la American Chemical Society.** Varios autores. Ed. Reverté. 2005.



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- **Cuestiones y ejercicios de Química Orgánica. Una guía de autoevaluación.** E. Quiñoá y R. Riguera (2ª Ed.) Ed. Mc Graw Hill 2004.
  - **Nomenclatura y representación de los compuestos orgánicos (Una guía de estudio y autoevaluación).** E. Quiñoá y R. Riguera. Ed. Mc Graw Hill 2005.

