

Organic Chemistry

Calendar: 2nd day semester

Contact Hours: T 30,0h; TP 30,0h; OT 7,5h

Scientific Area: Chemistry

Intended learning outcomes (knowledge, skills and competences to be developed by the students):

The objectives for students are: to become familiar with formulas, structures, nomenclature and concepts in the field of organic chemistry; to recognize the importance of a given molecule, the role and distribution of electrons that can intervene in organic reactions; to classify the reactions of organic compounds; to understand the chemical reactions and justify mechanistically these reactions. Apply the knowledge of the reactivity of different functional groups in order to obtain new compounds; to acquire the concept of geometry of molecules in space associated with the study of stereochemistry.

It is intended that students acquire skills to access profession as chemical engineering professionals in Oil Technologies.

Syllabus:

1. Introduction: Functional groups and IUPAC rules. Basic concepts.
2. Alkanes and cycloalkanes: Introduction. Conformational analysis. Reactions.
3. Stereochemistry: Chirality e symmetry. Configuration specification. Optical activity e Racemic mixture.
4. Alkyl halides: Introduction. Nucleophilic substitution reactions. Elimination.
5. Alkenes and alkynes: Introduction. Hydrogenation and addition reactions. Conjugated dienes. Resonance - addition. Polymerization.
6. Aromatic compounds: Aromaticity. Properties and stability. Electrophilic substitution – Mechanism and substituents.

7. Carbonyl and carboxyl compounds: a) Aldehydes and ketones. Introduction. Reactions. b) Carboxylic acids. Reactions. Carboxylic acids derivatives and their reactions.
8. Compounds of biological relevance.

Evidence of the syllabus coherence with the curricular unit's intended learning outcomes:

The main goal of this curricular unit is to allow the student to acquire organic chemistry basic knowledge, to acquire a solid formation and skills in an area of great importance and application at the industrial level.

In this sense, the syllabus is structured so as to focus the basic concepts of organic chemistry: in the beginning, focusing on the structure of organic compounds, main functional groups and nomenclature rules, and henceforth, with a gradual increase in complexity, focusing on each of the main groups of organic compounds, their properties and reactivity (synthesis and reactions they perform), thus describing the general organic reaction mechanisms (substitution, elimination, addition). The syllabus further focuses on spectroscopic tools to analyse and identify organic compounds, and on the geometry and stereospecificity typical of organic compounds

References:

- 1 - Organic Chemistry, T.W. Graham Solomons and Craig B. Fryhle, 10th edition, John Wiley & Sons, ISBN10: 0470524596, 2011
- 2 - Química Orgânica, Robert Morrison e Robert Boyd, Fundação Gulbenkian, 15ª edição, ISBN-13: 9789723105131, 2009
- 3 - Introduction to Organic Chemistry, William H. Brown and Thomas Poon, John Wiley & Sons; 3rd Edition, ISBN-10: 0471444510, 2004
- 4 - Guia IUPAC para a Nomenclatura de Compostos Orgânicos, SPQ, LIDEL, ISBN-13: 9789727571505, 2002
- 5 - Organic Chemistry, Jonathan Clayden, Nick Greeves, Stuart Warren and Peter Wothers, OUP Oxford, ISBN-10: 0198503466, 2001