

28907 - Chemistry II

Syllabus Information

Academic year: 2023/24

Subject: 28907 - Chemistry II

Faculty / School: 201 - Escuela Politécnica Superior

Degree: 583 - Degree in Rural and Agri-Food Engineering

ECTS: 6.0

Year: 1

Semester: Second semester

Subject type: Basic Education

Module:

1. General information

The objectives of the subject are: To provide a basic knowledge of organic chemistry, ion exchange equilibria and colloid chemistry, and relate it to the field of Agricultural Engineering (i), to train in the laboratory work environment (ii), to differentiate the characteristics of the different types of fertilizers and pesticides more common, and to recognize their role in food production and possible adverse effects on the environment, as well as the alternatives that currently exist (iii). These approaches and objectives are aligned with the Sustainable Development Goals (SDGs) of the United Nations Agenda 2030 (<https://www.un.org/sustainabledevelopment/es/>). In specifically, the learning activities foreseen in this subject will contribute to the achievement of goals 2.3 and 2.4 of objective 2, and also to the achievement of goals 3.9, 6.3 and 12.4 of objectives 3, 6 and 12 respectively.

2. Learning results

1. Naming and formulating organic compounds.
2. Describe the bonding in organic molecules and the intermolecular forces that occur between them and explain their relationship to the state and solubility of organic compounds.
3. Distinguish and explain the different types of isomerism that occur in organic compounds.
4. List the main reactions that organic compounds undergo.
5. Be able to describe the ion exchange equilibrium and the different types of ion exchange substances that exist.
6. Identify the main colloidal particles that constitute the soil colloidal system and explain their physicochemical behavior.
7. Describe and compare the most common fertilizers and pesticide families.
8. Differentiate the possible consequences that the use of these substances can have on soil characteristics and the environment, and know the main existing alternatives.
9. Solve numerical problems and practical assumptions using the concepts and models taught in theory.
10. Safe handling of laboratory instruments and reagents.
11. Evaluate the results obtained in the experiments carried out in the laboratory relating them to the theoretical knowledge acquired.
12. Be able to handle diverse bibliographic sources, select relevant information, prepare a written work and present it clearly.

Learning results 7 and 8 are aligned with the SDGs described in section 1.

3. Syllabus

Theory program:

Topic 1: Formulation and nomenclature of organic chemistry.

Topic 2. Introduction to organic chemistry.

Topic 3. Ion exchange equilibria.

Topic 4. Soil colloidal systems.

Topic 5. The plant, the soil and fertilizers.

Topic 6. Nitrogen.

Topic 7. Phosphorus.

Topic 8. Potassium.

Topic 9. Secondary macronutrient and micronutrient fertilizers.

Topic 10. Pesticides.

Practical activities program:

1. Identification of functional groups.
2. Esterification reaction.
3. Saponification reaction.
4. Ion exchange (I).
5. Ion exchange (II).
6. Determination of the carbon and organic matter content of a soil.
7. Determination of ammonium nitrate in fertilizers.

4. Academic activities

Participatory lectures 25 hours

The theory program of the subject will be developed.

Problem solving and case studies: 14 hours

Problems and case studies will be carried out in small groups to help improve the understanding of the contents of the subject.

Practical laboratory sessions: 15 hours

Some of the most common experiments in an organic or agricultural chemistry laboratory will be put into practice in small groups or agricultural chemistry laboratory.

Supervised work: 20 hours

Supervised group work will be carried out on specific aspects of agricultural chemistry.

Study and personal work: 70 hours

Assessment tests. 6 hours

5. Assessment system

Global assessment through the following assessment activities:

A1. Written test on formulation and nomenclature of organic chemistry (15%).

A2. Theoretical-practical written test on the concepts of the theory program (40%).

A3. Complementary multiple-choice questionnaire to A2 (5%).

A4. Written test on problems and cases (15%).

A5. Theoretical-practical written test on the practice program. In addition, one of the practices of laboratory must be carried out according to the program (15%).

A6. Tutored group work (10%).

A minimum of 4 out of 10 points will be required for averaging, except in activity A1 for which a minimum of 5 out of 10 points will be required. Activities A1, A3, A5 and A6 may be approved during the term (continuous assessment), without prejudice to the student's right to take the global test. In relation to A3, if continuous assessment is chosen, a questionnaire will be given through Moodle at the end of each topic. On A5, if you opt for continuous assessment, you must attend the corresponding practical sessions and pass a theoretical-practical exam at the end of them. The detailed definition of the evaluation system will be explained in the presentation of the subject.

The success rates (in parentheses) for the last three years are as follows: 2019/20 (97.56%), 2020/21 (65.63%), 2021/22 (73.91%).