Universidad Zaragoza

Academic Year/course: 2024/25

28965 - Applied soil science

Syllabus Information

Academic year: 2024/25
Subject: 28965 - Applied soil science
Faculty / School: 201 - Escuela Politécnica Superior
Degree: 583 - Degree in Rural and Agri-Food Engineering
ECTS: 5.0
Year: 4
Semester: Second semester
Subject type: Optional
Module:

1. General information

This subject provides knowledge of the soil as:

- A natural resource to be managed sustainably in order to provide ecosystem services: food and raw materials, quality water, carbon sequestration...
- A complex environment whose management must avoid the loss of its quality: by salinization, by eutrophication, by erosion,..
- A component of every terrestrial ecosystem, whose knowledge is essential in the design of agronomic experiments and the transfer of their results.
- The living epidermis of the Earth, the result of the interaction of formation factors, which gives rise to different types of soils, with their own designation (classification) and suitability (evaluation) for different agricultural uses.

This knowledge is aligned, among others, with the SDG3, SDG13 and especially SDG15: The life in terrestrial ecosystems.

2. Learning results

In order to pass this subject, students must prove they are able to:

1. Diagnose the fertility level of agricultural soils and propose their improvement through the use of amendments organic and/or mineral fertilizers.

2. Recognize the different types of soils, interpret their properties, and know their names (classification), as well as inferring the distribution of soils in the landscape (mapping).

3. Evaluate the suitability that different types of soils and territories may have for different uses (rice, corn, wheat, barley, alfalfa, vines, etc.).

4. Acquire skills in predicting soil behavior under certain cultural practices.

5. Interpret how the soil has been formed (genesis), what are its components and properties (constituents).

3. Syllabus

Topic 1. Soil morphology and description: observed and inferred properties.

Topic 2. Diagnosis of soil fertility.

Topic 3. Mineral or inorganic fertilization of agricultural soils

Topic 4. Organic fertilization of agricultural soils

Topic 5. Agronomic management of soils affected by salts

Topic 6. Soil conservation

Topic 7. Soil formation factors and processes

Topic 8. What are the names given to soils? The World Reference Base (WRB) of the soil resource as an international soil classification system (IUSS, 2022)

Topic 9. Soil evaluation and land management systems

Topic 10. Soil mapping

4. Academic activities

1 - Expository and participative classroom lectures (26 h)

2 - Laboratory and greenhouse practices: activities of demonstrative-active-interrogative type: (14 h)

2.1. Rain simulation. Qualitative determinations

2.2. Physical properties: porosity, structural stability, texture.

2.3. Chemical properties: pH, EC, organic matter, carbonates, gypsum.

2.4. Biological properties: edaphic respiration, enzymatic activities

3 - Field trips: participatory-active-interrogative activities (10h, subject to budget availability)

4 - Tutorials: sessions that, at the students' request, should solve doubts about the previous activities.

5 - Non-face-to-face activities: resolution of exercises by the student: www.cienciadelsuelo.es; www.suelosdearagon.com

6 - Exams: preparation and performance of exams, including oral presentation of papers.

Activities 5 and 6 add up to 75 hours; in total 125 hours.

5. Assessment system

The assessment will be continuous and will include activities such as:

Activity 1. Practice with rain simulator: soil and water quality under different types of cover (mulch, crop, bare soil). Collective presentation of a report on the results obtained in the session at greenhouse: 20%

Activity 2. CSI Project: Take the Soil and Investigate. From samples of an unknown soil profile, the student should describe its morphological properties, apply simple tests to decide which basic properties has and what origin. Individual presentation of a report and oral presentation of the results: 20%

Activity 3. MAPA Project. Interpretation of an on-line soil map. Individual presentation of a report on the results obtained in the cabinet session: 20%

Activity 4. Special practices. Field trips to identify various soil typologies in the field and to interpret their use limitations and potential for improvement. Multiple choice test, to be answered via Moddle: 20%

Activity 5. IARASOL Project. On-line soil classification. http://www.suelosdearagon.com/. Program self-qualifying: 20%.

The detailed assessment system will be explained in the presentation of the subject.

The success rates for the subject in the last three years are: 2020/21: 100%; 2021/22: 100%; 2022/23: 100%

6. Sustainable Development Goals

3 - Good Health & Well-Being
13 - Climate Action
15 - Life on Land