Universidad Zaragoza

Academic Year/course: 2024/25

25208 - Soil science

Syllabus Information

Academic year: 2024/25
Subject: 25208 - Soil science
Faculty / School: 201 - Escuela Politécnica Superior
Degree: 571 - Degree in Environmental Sciences
ECTS: 6.0
Year: 1
Semester: Second Four-month period
Subject type: Basic Education
Module:

1. General information

This subject provides knowledge of the soil as:

(1) a complex medium, whose components (organic and mineral) and properties (physical, chemical and biological) result from the interaction of the formation factors, through multiple processes

(2) a natural resource that is non-renewable in the short term and therefore requires sustainable management to provide all of its ecosystem services: food and biomass production, habitat for organisms, carbon sequestration, water storage and filtration, etc.

(3) a component of every terrestrial ecosystem, the knowledge of which is essential in the field of environmental sciences

All of this is aligned with the Sustainable Development Goals of the 2030 Agenda: SDG2, SDG3, SDG4, SDG6, SDG13 and especially SDG15: Life in terrestrial ecosystems.

2. Learning results

The student, in order to pass this subject, must demonstrate:

-To know the factors and processes that form the soil and relate them to its properties and components.

-To identify the soil-landscape relationship to deduce the typology, characteristics and distribution of soils by geoforms

-To know the analytical techniques that allow the physical, chemical and biological characterization of soils.

-To describe macro-morphologically the soils, according to the international methodology (FAO).

To integrate field description and analytical results with factors and processes to interpret edaphogenesis and optimize sustainable soil use

-To value soil as a key element in environmental management plans, in protected natural areas or in the ecological restoration of degraded areas

- To be able to transmit, orally and in writing, individually or collectively, the above learning results.

The learning results are aligned with the SDGs, in particular with 15.3 and, secondarily, with 13.3

3. Syllabus

Topic 1. Concept and description of soils: observed and inferred properties. Soil morphology: genetic and diagnostic horizons.

Topic 2. Inorganic soil components. Soil minerals and derived properties.

Topic 3. Soil organic components. Carbon cycle. Organic matter and soil fertility. Types of humus in forest soils. Living soil organisms.

Topic 4. Soil water and air. Energy status and water retention in the soil. Infiltration. Redox processes.

Topic 5. Soil-forming factors: parent material, climate, relief, living organisms and weather. Relationships soil-landscape. Chronosequences and toposequences of soils in Aragón.

Topic 6. Soil-forming processes: Physical, chemical and biological weathering. Transformations.

Translocations. Additions and losses.

Topic 7. Physical properties and soil management: structural stability, porosity, granulometry, plasticity, extensibility, etc.

Topic 8. Soil chemical properties and management: pH, base saturation, main nutrients, organic matter, chelation, etc.

Topic 9. Biological properties as indicators of environmental quality: respiration, microbial biomass, qCO2, enzymatic activities.

Topic 10. Soil quality in the face of degradative processes, self-purification and recovery. Case studies in Aragón.

4. Academic activities

1 - Explanatory and participative classroom lectures.

2 - Laboratory and greenhouse practices: activities of demonstrative-active-interrogative type. Examples: sampling, description and preparation of soil samples; physical analysis (granulometry, structure), chemical analysis (pH, carbonates, EC, MO), etc.

3 - Field practices: participatory-active-interrogative activities (subject to budget availability): tentative classification WRB (IUSS, 2022)

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

5 - Non-face-to-face activities: resolution of exercises and case studies by the student.

6 - Examinations: preparation and conduct of examinations

5. Assessment system

The evaluation will consist of a global face-to-face test, on the dates set by the Polytechnic school, made up of three parts:

1. Test of the contents of the syllabus of the subject, with two types of questions: i) interpretation of a soil and ii) multiple answers, from which the only correct one must be chosen. The grade for this part constitutes 60% of the overall grade.

2. Practical test, to be taken if a minimum grade of 4/10 has not been obtained in the continuous evaluation of the

practices. All students who have completed the laboratory practices and the derived questionnaires will be exempted to answer via Moodle, as the sessions progress. The grade for this part constitutes 20% of the overall grade.

3. Grade of a practical work with delivery of a written report (individual or group) during the term and before the date of the global test. The grade for this part constitutes 20% of the overall grade.

The overall grade of the subject will be calculated as the weighted average of the previous activities provided that the student has obtained a minimum grade of 4/10 in each of the two parts. The subject will be considered passed when the weighted average of both parts is equal or higher than 5.

Students who have to take the exam again will be able to choose, in subsequent calls, between sitting again for all the evaluation activities or only for those that they have failed.

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

The success rate of the subject in the last three academic years has been: 45,24% 62,50% 92.00%

6. Sustainable Development Goals

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