

## 25218 - Soil degradation and pollution

### Syllabus Information

**Academic year:** 2023/24

**Subject:** 25218 - Soil degradation and pollution

**Faculty / School:** 201 - Escuela Politécnica Superior

**Degree:** 571 - Degree in Environmental Sciences

**ECTS:** 6.0

**Year:** 2

**Semester:** Second Four-month period

**Subject type:** Compulsory

**Module:**

### 1. General information

This subject provides knowledge of the soil as:

(1) a natural resource capable of providing ecosystem services if it is managed in a sustainable way avoiding processes that can lead to its degradation, either by salinization, eutrophication, erosion, pollution..

(2) a component of any terrestrial ecosystem, whose knowledge is essential both for its restoration (in quarries, burned areas, riverbanks, etc.) as well as in the design of experiments and the transfer of their results

(3) a complex medium with properties (physical, chemical and biological) resulting from the interaction of forming factors through multiple processes.

All these aspects are aligned with the Sustainable Development Goals of the 2030 Agenda: SDG2, SDG3, SDG4, SDG 6, SDG13 and especially SDG 15 (Life in terrestrial ecosystems).

### 2. Learning results

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

-Describe and integrate knowledge about soil properties and processes that can lead to soil degradation, including contamination processes

-Describe the techniques for assessment, management, conservation and recovery of degraded soils, including contaminated soils, for the restoration of soil ecosystem services (functions) required by each degradation process

- Use analytical techniques for physical, chemical and biological characterization of soils throughout the restoration process

-Interpret the results obtained in soil analysis and in the resolution of practical cases related to the concepts learned in theory

-Solve problems, make decisions and develop management plans with environmental sensitivity and in accordance with current legislation

-Express adequately, orally and in writing, the methods, results and interpretations of real cases commissioned for study, individually or in groups

### 3. Syllabus

Topic 1. Types of soil degradation (physical, chemical and biological) and effects on ecosystem services.

Topic 2. Degradation due to water erosion. Rainfall erosivity and soil erodibility. Study methods.

Topic 3. Water erosion prevention and control techniques. Bioengineering applied to erosion control.

Topic 4. Soils affected by forest fires: fire effects and emergency treatments.

Topic 5. Soils affected by salts: management and recovery techniques.

Topic 6. Restoration, rehabilitation and recovery of degraded soils.

Topic 7. Soils affected by open-pit mining activities: Technosols.

Topic 8. Conservation vs. conventional agriculture. Use of ground covers

Topic 9. Organic matter management and carbon sequestration.

Topic 10. Contamination by over-fertilization and phytosanitary products.

Topic 11. Contamination by organic compounds.

Topic 12. Heavy metal contamination.

Topic 13. Rehabilitation or remediation of contaminated soils.

Topic 14. Soils affected by pesticides: the case of lindane.

## 4. Academic activities

1 - Explanatory and participative classroom lectures.

2 - Laboratory and greenhouse practices: activities of demonstrative-active-interrogative type. For example: structure and germination, structural stability, microbial reduction of soils, mineralization, liming and acidification, salinization, dynamics of fluid contaminants in soils.

3 - Field practices: participatory-active-interrogative activities (subject to budget availability ). Soil-landscape relationships in a north-south transect (Hoya de Huesca-Monegros).

4 - Tutorials: sessions that, at the students' request, should help to solve 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 face-to-face global test, on the dates set by the Polytechnic School, with two parts:

1. Test with program contents in two formats: i) short answers and ii) multiple answers, to choose the only correct one. The grade for this part constitutes 60% of the overall grade.

2. Test on the laboratory practices, only if the student has not reached 4/10 in the continuous evaluation. This will consist of laboratory practices and their derived questionnaires, to be answered via Moodle, as the sessions progress. The grade for this part constitutes 40% 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 to 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 success rate in the last three academic years has been 86, 41 and 92%.

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