

## **Syllabus Information**

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**Academic year:** 2024/25

**Subject:** 25260 -

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

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

**ECTS:** 5.0

**Year:**

**Semester:** Second Four-month period

**Subject type:** Optional

**Module:**

### **1. General information**

The overall objective of the subject is for students to understand the dynamics of nutrient cycles and their relationship with the fertility of ecosystems through knowledge of the soil and soil-plant relationships; and the interpretation and analysis of the functioning of these relationships and the properties of the soil under very specific management conditions, such as the use of certain byproducts. The student must be able to apply basic scientific principles to the management and recycling of organic waste so that they can use them in the development of their professional activity, applying the most appropriate technologies to the environment.

### **2. Learning results**

The student, by taking this subject, will be able to... Apply the basic concepts related to waste, soil and fertility. Differentiate and value the different types of by-products generated in different sectors of activity in terms of their agronomic interest. Characterize the different types of waste. Recognize and use each of them according to specific situations. Analyze the risk/benefit balance of the main by-products or a new one that is presented. Know the information that must be collected about a by-product and about the soil and crop for which it may be used, before using it. Apply the rules to follow in a laboratory and carry out basic experiments that involve the use and application of organic waste. Interpret the results obtained in the analysis and resolution of practical cases, related to the concepts learned in theory. Solve problems, make decisions and develop management plans and use of by-products, with environmental sensitivity. Express adequately, both orally and in writing, the methods, processes, results obtained and their analysis in the cases commissioned for study, in the form of individual and/or group work.

### **3. Syllabus**

#### **BLOCK 1: SOIL FERTILITY AND GENERAL ASPECTS (2/5)**

Theory program

Introduction: The problem of the generation of byproducts in human activities. Planning the application of waste to the soil: Limitations, advantages and undesirable effects. Soil quality. Concept, definitions and management. Soil fertility: M.O. and primary mineral nutrients.

Lab program - Assessment of edaphic parameters - Characterization of organic waste.

#### **BLOCK 2: SPECIFIC CYCLES, INTEREST AND CONSIDERATIONS ON WASTE (3/5).**

Theory program Generation and destination of waste. General aspects and definitions Cycle of secondary elements, Ca, Mg, Na and K. Importance in the soil. Necessity and effects for plants. Microelement cycle. Importance on the ground. Necessity and effects for plants. Heavy metals in the soil. Origin and accumulation. Effects on plants. Waste management for agriculture. Applicable regulations. Interest and restrictions in the use of waste from industrial or extractive activities. Main features. Agronomic interest. Interest and restrictions in the use of waste from urban and leisure activities. Main features. Agronomic interest. Interest and restrictions in the use of waste from livestock activities. Main features. Agronomic interest. Interest and restrictions in the use of waste from agricultural, forestry and agri-food activities. Main features. Agronomic interest. Transportation and distribution of waste. Application techniques. Incorporation into the ground

Lab program

Use of byproducts in agriculture. Discussion of cases. Economics of using by-products as fertilizers. Observation of byproducts. Previous tests. Physical effects of some byproducts applied to the soil. Effects of some byproducts on plant germination and growth. Evolution of different types of byproducts.

Field trips: 1. visit to a demonstration of the application of agricultural and livestock by-products in the field, and 2. visit to a MSW composting plant (if budget availability allows it).

### **4. Academic activities**

The program offered to the student to help them achieve the expected results includes the following activities...

Theoretical sessions: They will consist of expository and participatory lessons.

Practices in office and laboratory: Demonstrative-active-interrogative type activities in which students will learn various techniques and procedures and train their capacity for observation, analysis and critical sense.

Field practices and technical outings: Visits to places where the student will be able to observe and analyze some of the objects and processes studied in the theoretical classes to test their ability to observe, analyze and synthesize. These are clearly participatory-active-interrogative activities.

## 5. Assessment system

Global evaluation is carried out. In each call the evaluation will consist of three activities:

1. Global test written at the end of the semester, according to the syllabus of the subject and according to the EPS exam schedule (60% of the final grade)
2. Participation in practices and written presentation of a memory in those in which it is indicated (20% of the final grade)
3. Written presentation of a course work (20% of the final grade)

Activities 2 and 3 can be carried out and it is recommended, on the dates established at the beginning of the course.

All those students who do not attend the practices or do not present the report on the agreed date (or who wish to raise their grade), must take an individual written test, the same day that appears in the EPS exam calendar, which it will deal with the contents of the laboratory practices and/or the topic proposed for the course work.

The evaluation system seeks to contemplate the acquisition of knowledge, skills and aptitudes of the subject. Participation will be valued as well as the content, presentation and formal correction of the proposed activities. In the evaluation of the practical program, not only the ability to apply theoretical content will be taken into account, but also the application of the attitudes considered in the section on specific competences when solving the cases raised. To pass the entire subject, it is necessary to obtain a grade equal to or greater than 5 in activity 1, and only then can it be averaged with the others. Activities 2 and 3, once passed (score equal to or greater than 5 out of 10) are kept, with that score, and will average with activity 1 in the call that the latter is passed.

In relation to the ODSs and in particular to targets 12.4 and 12.5, the theoretical foundation for the environmentally sound management of all waste throughout its life cycle and the reduction, recycling and reuse of organic waste is evaluated in the test theory, in the practice reports or in the course work. The contribution of these three activities represents 60%, 20% and 20% of the grade, representing 100% of the student's global classification.

Success rates in previous courses

2020/2021	2021/2022	2022/2023
-	100 %	-

## 6. Sustainable Development Goals

2 - Zero Hunger  
13 - Climate Action  
15 - Life on Land