

| Degree       | Type | Year |
|--------------|------|------|
| Microbiology | OP   | 4    |

## Contact

Name: Xavier Domene Casadesús

Email: xavier.domene@uab.cat

## Teachers

Sara Marañón Jimenez

## Teaching groups languages

You can view this information at the [end](#) of this document.

## Prerequisites

Although there are no official prerequisites, it is convenient that the student has: 1) The basic knowledge about Earth Sciences and the Environment that acquired in this subject during the secondary education. 2) The basic knowledge of the subjects of Chemistry, Physical Environment, Ecology and Prospecting of the Natural Environment.

## Objectives and Contextualisation

The learning objectives of this course are: i) to define the most relevant components and properties of soil and its organization, ii) to be able to take representative soil samples and characterize them following standardized methods, and iii) to interpret soils after observing them under field conditions and obtaining analytical results in terms of soil formation processes and limitations or opportunities for use.

## Learning Outcomes

1. CM16 (Competence) Propose microbial processes to assess the environmental impact of human activity, as indicators of ecosystem alteration, as well as to recover contaminated environments.
2. KM24 (Knowledge) Describe the most relevant components and properties of land, its organization, diversity and biological activity.
3. SM23 (Skill) Select the appropriate methodologies to characterise populations and communities of microorganisms from environmental and industrial samples and their abiotic environment.

## **Content**

### BLOCK I: Soil as a natural system

1. Concept of soil.
2. Morphological description of the soil profile and the horizons.
3. Study of soils in the field.

### BLOCK II: Organization and soil components

4. Soil texture and colour.
5. Soil structure.
6. Soil porosity and density.

### BLOCK III: Mineral soil constituents

7. Parental materials and weathering.
8. Silicate minerals.
9. Non-silicate minerals.

### BLOCK IV: Soil organic matter, its transformations, and biological activity

10. Soil organic matter (SOM) and role in the global carbon cycle.
11. SOM composition and dynamics.
12. The edaphic system.

### BLOCK V: Soil as a water reservoir

13. Retention of water in the soil.
14. Movement of water in the soil.

### BLOCK VI: Soil physical properties and chemical properties

15. Nutrients and soil retention capacity .
16. Acidity, salinity and sodicity.

### BLOCK VII: Soil diversity

17. Soil classification.
18. The WRB-FAO system and main soil types in Europe.
19. Soil maps.

\*The language of instruction will be predominantly Catalan, with the possibility of some sessions in Spanish.

## Activities and Methodology

| Title              | Hours | ECTS | Learning Outcomes      |
|--------------------|-------|------|------------------------|
| Type: Directed     |       |      |                        |
| Field practices    | 8     | 0.32 | KM24, SM23, KM24       |
| Lab practices      | 12    | 0.48 | KM24, KM24             |
| Master classes     | 34    | 1.36 | CM16, KM24, SM23, CM16 |
| Type: Supervised   |       |      |                        |
| Field work         | 2     | 0.08 | KM24, SM23, KM24       |
| Tutorial meeting   | 2     | 0.08 | KM24, SM23, KM24       |
| Type: Autonomous   |       |      |                        |
| Poster preparation | 58    | 2.32 | KM24, KM24             |
| Study              | 30    | 1.2  | CM16, KM24, SM23, CM16 |

Master classes. The expository sessions are the main activity in the classroom, always combined with case studies and activities for an initiation in this discipline.

Field practices. They are essential for the students' application of the knowledge acquired in relation to the description and sampling of soils. The practices consist of a one-day field trip in which the students, in groups of 5, will describe the environment where a soil has been formed, make a pit, describe the different horizons, and take samples for analytical purposes.

Laboratory practices. These sessions aim to familiarize students with the most common analytical procedures in soil characterization, but at the same time also obtain lab data from the samples collected in the field for the preparation of a poster. The practices will be organized in three sessions of four hours each in which the students, in the same groups of the field trip, will analyze the soil samples collected. To be able to attend the laboratory practices, as it is necessary that the student have passed the biosafety and safety tests available at the Virtual Campus, and be aware and accept the Biosciences Faculty laboratories.

Group work (poster). As the culmination of the field and the lab practices, the group of students prepares a poster including the description of the study area and the soil, the analytical results, and an interpretation in relation to the formation of the soil and its capability.

Tutoring session. A tutorial session with the entire class group will be carried out shortly before the poster hand-out, which intends to resolve questions raised during the preparation of the poster.

AI use. In this course, the use of Artificial Intelligence (AI) technologies is permitted as an integral part of the project development, provided that the final outcome reflects a significant contribution from the student in terms of analysis and personal reflection. The student must clearly identify which parts have been generated using such technology, specify the tools used, and include a critical reflection on how these tools have influenced both the process and the final result of the activity. Lack of transparency in the use of AI will be considered academic dishonesty and may result in a penalty in the activity's grade or more severe sanctions in serious cases.

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

## Assessment

### Continuous Assessment Activities

| Title        | Weighting | Hours | ECTS | Learning Outcomes |
|--------------|-----------|-------|------|-------------------|
| Examen test  | 50%       | 2     | 0.08 | CM16, KM24, SM23  |
| Midterm test | 25%       | 2     | 0.08 | CM16, SM23        |
| Poster       | 25%       | 0     | 0    | CM16, KM24, SM23  |

The 2017 modification of the Title IV (Appraisal) of the UAB Regulations according to the RD 1393/2007, applicable from the 2018-2019 academic year, will rule the appraisal, which will consist of three activities:

- 1) Mid-term test (35% weight). It consists of questions and/or short answer exercises on the main concepts on the subject that must be reached at the time of its completion.
- 2) Final test (35% weight). It consists of questions and/or exercises that will be formulated in the relation the morphological description and the analytical results of a soil. This test will have an integrating character of the contents imparted throughout the course, according to the continuous appraisal system in force at the UAB.
- 3) Poster (20% weight). It consists in the hand-out of the poster in PDF format for each field and lab practices group. This activity cannot be retaken.

Test review. At the time of publication of the exam notes in the virtual campus, the date, time and place of the review will be communicated for any interested student. There will be no individual reviews outside of these hours.

Retake exam and 'No Avaluable' criteria. The students can only attend to a retake exam if the weighted mean of the midterm and the final test is below 5 and over 3.5.

The mark of the retake test substitutes the average (weighted) mark of the other tests (hence the retake test having a 75% weight), and will include all the contents of the subject.

The student will be graded as "No Avaluable" if the weight of all the evaluation activities conducted is below a 67% weight of the final score. The attendance to practical sessions (or field trips) is mandatory. Students missing more than 20% of programmed sessions will be graded as "No Avaluable".

Appraisal criteria. Once all the evaluation steps are completed, including the retake test, a student will be considered as 'failed' when the weighted average mark is below 5, or when the weighted mark of the midterm and the final exams or that of the retake exam is below 4.5.

Students in single evaluation mode. Consult with the Faculty of Biosciences on how to opt for this evaluation mode or visit the website <https://www.uab.cat/doc/CriterisAvaluacioUnica>. The single evaluation in this subject will correspond to a single synthesis test that will assess the content of the entire theoretical program of the subject. The grade obtained in this synthesis test will account for 75% of the final grade for the subject. The single evaluation test will be held on the same date as the final scheduled continuous evaluation test, and the same recovery system as the continuous evaluation will be applied. As for the evaluation of practical activities (poster), it will follow the same process as the continuous evaluation and will account for 25% of the final grade for the subject. This final activity cannot be recovered. The review of the final grade follows the same procedure as for continuous assessment.

## Bibliography

### Books:

- Brady NC, Weil RR. 2016. The nature and properties of soils (14th ed.). Prentice Hall Upper ( [http://wps.prenhall.com/chet\\_bradynatureandp\\_13](http://wps.prenhall.com/chet_bradynatureandp_13))
- Porta J, López-Acevedo M, Poch RM. 2014. Edafología: uso y protección de suelo. Mundi-Prensa. Madrid.
- Schoeneberger PJ, Wysocki DA, Benham EC, Broderson WD. 1998. Libro de campaña para descripción y muestreo de suelos. National Soil Survey Center - Natural Resources Conservation Service - USDA. Nebraska. ([ftp://ftp-fc.sc.egov.usda.gov/NSSC/Field\\_Book/FieldBookVer3.pdf](ftp://ftp-fc.sc.egov.usda.gov/NSSC/Field_Book/FieldBookVer3.pdf))
- Stocking M. & Murnaghan N. (2003) Manual para la evaluación de campo de la degradación de la tierra. Ediciones Mundi-Prensa, Madrid, 172 p.
- Tan, K. H. 1994. Environmental soil science. Marcel Dekker. New York.
- Van Reeuwijk, L. P. 2002. Procedures for soil analysis. ISRIC - FAO. [2847]

### Soil classification keys:

- IUSS Working Group WRB, 2015. Base referencial mundial del recurso suelo 2014. Actualización 2015. Sistema internacional de clasificación de suelos para la nomenclatura de suelos y la creación de leyendas de mapas de suelos. Informes sobre recursos mundiales de suelos 106. FAO, Roma. ( <http://www.fao.org/3/i3794es/l3794es.pdf> )
- USDA-NRCS. 2014. Claves para la Taxonomía de Suelos ( [https://www.nrcs.usda.gov/Internet/FSE\\_DOCUMENTS/nrcs142p2\\_051546.pdf](https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_051546.pdf))

### Soil maps:

- Mapa de sòls de Catalunya 1:25.000 ( <http://www.icgc.cat/ca/Administracio-i-empresa/Descarregues/Cartografia-geologica-i-geotematica/Cartog> )
- Dades de perfils a Catalunya: Geoíndex - Sòls ( <http://www.icgc.cat/Administracio-i-empresa/Eines/Visualitzadors-Geoindex/Geoindex-Sols>)
- IEC Cartografia de Sòls (<https://www.iec.cat/mapasols/Ca/MapaInteres.asp?Grup=F&Opcio=15>)
- European Soil Data Centre (ESDAC) (<https://esdac.jrc.ec.europa.eu/resource-type/maps>)

### Webpages:

- USDA - Natural Resources Conservation Service. Technical References: <http://soils.usda.gov/technical/>
- USDA - Natural Resources Conservation Service. Soil Education. <http://soils.usda.gov/education/>
- Universidad de Granada. Departamento de Edafología y Química Agrícola. <http://edafologia.ugr.es/index.htm>
- Soil-net. Welcome to Soil-net.com. <http://www.soil-net.com/>
- International Union of Soil Sciences. Soil science education. <http://www.iuss.org/popup/education.htm>
- Institut d'Estudis Catalans. Protecció de sòls, mapa de sòls de Catalunya. <http://www.iecat.net/mapasols/index.html>

## Software

None.

## Groups and Languages

Please note that this information is provisional until 30 November 2025. You can check it through this [link](#). To consult the language you will need to enter the CODE of the subject.