

Soil Science

Code: 100817
ECTS Credits: 6

2024/2025

Degree	Type	Year
2500251 Environmental Biology	OB	2

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 objective of the subject is training the student in his/her ability i) to describe the most relevant components and properties of the soil and its organization, ii) to take representative samples and analyze them using standardized methods, and iii) to interpret the results in order to deduce the soil formation processes.

Competences

- Act with ethical responsibility and respect for fundamental rights and duties, diversity and democratic values.
- Apply knowledge of theory to practice.
- Catalogue, assess and manage natural biological resources.
- Describe, analyse and assess the natural environment.

- Produce thematic cartographies of the natural environment.
- Reason critically.
- Solve problems.
- Take account of social, economic and environmental impacts when operating within one's own area of knowledge.
- Take sex- or gender-based inequalities into consideration when operating within one's own area of knowledge.

Learning Outcomes

1. Act with ethical responsibility and respect for fundamental rights and duties, diversity and democratic values.
2. Actuar en l'àmbit de coneixement propi avaluant les desigualtats per raó de sexe/gènere.
3. Apply knowledge of theory to practice.
4. Describe and sample land and interpret its properties.
5. Distinguish between the principal soil types.
6. Interpret maps of soils and draw maps of their aptitude.
7. Reason critically.
8. Resolve exercises on interpretation of soil analysis.
9. Solve problems.
10. Take account of social, economic and environmental impacts when operating within one's own area of knowledge.

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.

17. Soil classification.

18. The WRB-FAO system and main soil types in Europe.

19. Soil maps.

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Field practices	8	0.32	4
Lab practices	12	0.48	3, 4, 7, 8, 9
Master class	34	1.36	4, 5, 6, 8
Type: Supervised			
Field work	2	0.08	3, 4, 5
Tutorial meeting	2	0.08	3, 4, 7, 8, 9
Type: Autonomous			
Independent study	58	2.32	3, 4, 5, 6, 7, 8, 9
Poster work	30	1.2	3, 6, 7, 8, 9

Lectures. The exhibitions are the main activity that will be done in the classroom, as they allow transmitting basic concepts to many students in a short time. In addition, it will be accompanied with PowerPoint presentations and diverse educational materials that, if appropriate, will be available in the virtual campus.

Field practices. It is essential for the student to use the knowledge acquired in relation to the description and sampling of soils. They will consist of an entire day's trip in which students, in groups of 5, will describe the environment where a soil has formed, excavate a soil pit, and will describe the different horizons and will take samples for analytical purposes.

Lab practices. These sessions are designed with the aim that the students learn the most common analytical procedures in the soil characterization, to obtain sufficiently reliable and representative results of the samples that will have obtained in the field. They will be organized in three four-hour sessions in which the students, in

the same groups they did in the field, will analyze the samples and interpret the results. In order to attend it is necessary that the student had passed the biosafety and safety tests that will find in the Virtual Campus and to be knowledgeable and accept the working rules of the laboratories of the Faculty of Biosciences.

Collaborative work (poster). It consists on the culmination of the group work. A summary of the field practices and laboratory practices, and will be realized by the same working groups. It will consist of the realization of a poster that will include the description of the study area and the soil studied, the analytical results that have been obtained, and its interpretation in relation to the formation of the soil and its use abilities.

Tutorials. The collaborative work will be presented in a tutorial session that will serve to identify learning errors and seek the possibilities of solution in relation to collaborative work.

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

Continous Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Final test	50%	2	0.08	1, 2, 3, 4, 5, 6, 7, 8, 9, 10
Midterm test	25%	2	0.08	3, 7, 8, 9
Poster	25%	0	0	3, 4, 7, 8, 9, 10

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 (25% 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 (45% 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 (25% 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 retake of this single evaluation exam follows the same procedure as the 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_brady_natureandp_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)
- 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)

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/MapalInteres.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.

Language list

Name	Group	Language	Semester	Turn
(PCAM) Field practices	221	Catalan	first semester	morning-mixed
(PCAM) Field practices	222	Catalan	first semester	morning-mixed
(PCAM) Field practices	223	Catalan	first semester	morning-mixed
(PCAM) Field practices	224	Catalan	first semester	morning-mixed
(PLAB) Practical laboratories	221	Catalan	first semester	morning-mixed
(PLAB) Practical laboratories	222	Catalan	first semester	morning-mixed
(PLAB) Practical laboratories	223	Catalan	first semester	morning-mixed
(PLAB) Practical laboratories	224	Catalan	first semester	morning-mixed
(TE) Theory	22	Catalan	first semester	afternoon