

**Soil Science**

Code: 100817  
ECTS Credits: 6

Degree	Type	Year	Semester
2500251 Environmental Biology	OB	2	1

**Contact**

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**Use of languages**

Principal working language: catalan (cat)  
Some groups entirely in English: No  
Some groups entirely in Catalan: No  
Some groups entirely in Spanish: No

**Teachers**

Josep Maria Alcañiz Baldellou  
Andrea Vidal Durà

**Prerequisites**

Tot i que no hi ha prerequisits oficials, és convenient que l'estudiant tingui:

- 1) Els coneixements bàsics sobre Ciències de la Terra i del Medi Ambient que ha adquirit en aquesta assignatura.
- 2) Els coneixements bàsics de les assignatures de Química, Medi Físic, Ecologia i Prospecció del Medi Natural.

Per poder assistir a les pràctiques de laboratori cal que l'estudiant justifiqui haver superat les proves de biosegur

**Objectives and Contextualisation**

The objective of this subject is to give the student a training that makes him able to describe the most relevant co

**Skills**

- 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.

## **Learning outcomes**

1. Apply knowledge of theory to practice.
2. Describe and sample land and interpret its properties.
3. Distinguish between the principal soil types.
4. Interpret maps of soils and draw maps of their aptitude.
5. Reason critically.
6. Resolve exercises on interpretation of soil analysis.
7. Solve problems.

## **Content**

### **BLOCK I: The soil as a natural system**

1. Soil concept. The soil as a component and resource of the natural environment. Soil functions within ecosystem.
2. Morphological description of the soil profile and its horizons. Nomenclature of genetic horizons. Color of the soil.
3. The study of the soil in the field, taking samples for analytical purposes and prepare samples for analysis.

### **BLOCK II: Organization of soil components**

4. Dimensions of components. Granulometry and texture.
5. Soil structure. Morphological type of macrostructures. Structural stability.
6. Bulk density. Porosity.

### **BLOCK III: Mineral constituents of soil**

7. Primary and secondary minerals. Mineral transformations. Main physical and chemical processes of weathering.
8. Silicates, structure, composition and important properties. Origin of the electric charge.
9. Alteration complex: clay minerals, oxyhydroxides of iron and aluminum, specific characteristics and meaning in soil.

### **BLOCK IV: Organic matter, its transformations and biological activity of the soil**

10. Soil organic matter within the global carbon cycle. Origin and composition. Mineralization and humification processes.
11. Stabilization of organic matter. Humification. Characteristics of humic substances. Carbon sequestration.

12. Soil biology. Biological diversity in soils. Actions of organisms in the soil. Biological activity in the soil.

#### **BLOCK V: The soil as a water reservoir**

13. Water retention in soil. Water potential and characteristic functions of humidity. Water reserve and water available.

14. Flow of water in the soil. Infiltration and hydraulic conductivity. Sewer system.

#### **BLOCK VI: Physical and chemical properties of soil**

15. Type of interactions in the solid-liquid interface. Cation exchange capacity. Base saturation. Soil pH: meaning

16. Soil solution: cations and anions in solution. Salinity and sodicity.

#### **BLOCK VII: Soil diversity**

17. Classification of soils. General criteria. Diagnostic horizons.

18. Main classification levels.

19. Principal Soils of Catalonia

### **Methodology**

Lectures. The exhibitions are the main activity that will be done in the classroom, as they allow transmitting basic

Field practice. It is essential for the student to use the knowledge acquired in relation to the description and sampling

Lab practices. These sessions are designed with the aim that the students learn the most common analytical procedures

Collaborative work. It consists on the culmination of the group work. A summary of the field practices and laboratory

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

### **Activities**

Title	Hours	ECTS	Learning outcomes
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Type: Directed

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Field practices	8	0.32	2
Lab practices	12	0.48	1, 2, 5, 7, 6
Master class	34	1.36	2, 3, 4, 6
<b>Type: Supervised</b>			
Field work	2	0.08	1, 2, 3
Tutorial meeting	2	0.08	1, 2, 5, 7, 6
<b>Type: Autonomous</b>			
Independent study	58	2.32	1, 2, 3, 4, 5, 7, 6
Poster work	30	1.2	1, 4, 5, 7, 6

## Evaluation

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 test and 'not evaluable' criteria.** When the global weighted mean at the end of the evaluation is below 5 and over 3.9, the students are allowed to do a retake test. The mark of this 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.

To be eligible for the retake process, the student should have been previously evaluated in a set of activities equaling at least two thirds of the final score of the course or module. Thus, the student will be graded as "No Avaluable" if the weight of all conducted evaluation activities is less than 67% of the final score. 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.

## Evaluation activities

Title	Weighting	Hours	ECTS	Learning outcomes
Final test	50%	2	0.08	1, 2, 3, 4, 5, 7, 6

Midterm test	25%	2	0.08	1, 5, 7, 6
Poster	25%	0	0	1, 2, 5, 7, 6

## 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](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](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>