Universitat Autònoma de Barcelona

2020/2021

Soil Science

Code: 100994
ECTS Credits: 6

Degree	Type	Year	Semester
2500502 Microbiology	OT	4	0

The proposed teaching and assessment methodology that appear in the guide may be subject to changes as a result of the restrictions to face-to-face class attendance imposed by the health authorities.

Contact

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Use of Languages

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

Teachers

Josep Maria Alcañíz Baldellou
Andrea Vidal Durà

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 this subject training the students to be able to: i) properly describe the most relevant components and properties soils and its organization, ii) sample and make a basic characterization following standardized methods, and iii)) to interpret such information to understand a soil fundamental properties and formation process.

Competences

- Apply knowledge of theory to practice
- Develop critical reasoning skills in the field of study and in relation to the social context.
- Recognise the different levels of organization of living beings, especially animals and plants, diversity and bases of regulation of vital functions of organisms and identify mechanisms of adaptation to the environment.

Learning Outcomes

1. Apply knowledge of theory to practice

2. Describe soils, take samples and interpret the analyses.
3. Develop critical reasoning skills in the field of study and in relation to the social context.
4. Distinguish between the principal soil types
5. Recognise the components and the principal properties of soil.

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 roe in the global carbon cycle.

11. SOM compositionand 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 in Europe.

19. Soil maps.

Unless the requirements enforced by the health authorities demand a prioritization or reduction of these contents^.

Methodology

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.

*The proposed teaching methodology may experience some modifications depending on the restrictions to face-to-face activities enforced by health authorities.

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Field practices	8	0.32	1, 2, 3, 5
Lab practices	12	0.48	1, 2, 3, 5
Master classes	34	1.36	1, 2, 3, 4, 5
Type: Supervised			
Field work	2	0.08	1, 2, 3, 5
Tutorial meeting	2	0.08	1, 2, 3, 4, 5
Type: Autonomous			
Poster preparation	58	2.32	1, 2, 3, 4, 5
Study	30	1.2	1, 2, 3, 5

Assessment

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 theretake 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.

*Student's assessment may experience some modifications depending on the restrictions to face-to-face activities enforced by health authorities.

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Examen test	50%	2	0.08	1, 2, 3, 4, 5
Midterm test	25%	2	0.08	1, 2, 3, 5
Poster	25%	0	0	1, 2, 3, 5

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. Edafologia: 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/I3794es.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/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/
- Unversidad 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