Universidad Zaragoza

Academic Year/course: 2021/22

25208 - Soil science

Syllabus Information

Academic Year: 2021/22
Subject: 25208 - Edafología
Faculty / School: 201 - Escuela Politécnica Superior
Degree: 571 - Degree in Environmental Sciences
ECTS: 6.0
Year: 1
Semester: Second Four-month period
Subject Type: Basic Education
Module:

1. General information

1.3. Recommendations to take this course

This subject is offered in the English Friendly form

2. Learning goals

3. Assessment (1st and 2nd call)

4. Methodology, learning tasks, syllabus and resources

4.1. Methodological overview

The methodology followed in this course is oriented towards the achievement of the learning objectives. A wide range of teaching and learning tasks are implemented, such as lectures, seminars, laboratory sessions, fieldwork and autonomous work and study.

The preferred methodology in the lectures and practice sessions will combine an expositive and a demonstrative method. The expositive method, which is characterized by the communication of concepts, will be used when students do not have prior knowledge that allow participatory debate, or in the case of concepts or relationships requiring a formal precision. The demonstrative method is marked by demonstrating a task or a procedure, and will be used in practice tasks.

It is recommended for students the interrogative method, which consists on asking the teacher or trying to find answers to his questions, and the active method which consists on becoming the agent of his own formation through personal research, direct contact with reality and experience with the working group in which s/he is incorporated.

4.2. Learning tasks

This 6 ECTS (150 hours) course is organized as follows:

- **Lectures**. Expositive and participatory lectures that will be followed by exercises and discussion topics.
- **Seminars and laboratory practices**. Demonstrative and interrogative activities essentially aimed to dominate laboratory and field procedures.
- **Fieldwork**. Which is carried out during the second half of the course, and focused to the consolidation and expansion of concepts.
- **Autonomous work and study**. Study and application of the topics covered in the course, preparation of practices' reports, conduct of a group work, preparation of exams...

In relation to the Sustainable Development Goals, at the finish of the practical work, the students are invited to (1) assess the most sustainable use of the studied soil, according its physico-chemical attributes and the inference of its forming factors and processes, and (2) to evaluate of the occurrence of degradation processes, and how its use and management could counteract its effets.

4.3. Syllabus

This course will address the following topics:

Lectures

Section 1. Introduction

1. The concept of soil. Soil description: observed and inferred attributes. Soil morphology: genetic and diagnostic horizons. Methods for macromorphologic studies.

Section 2. Soil components

1. Mineral components. Soil minerals and their derived attributes.
2. Soil organic matter. The carbon cycle. Soil organic matter and fertility. Humus types in forest soils. Soil biomass.
3. Soil water and atmosphere. Water holding capacity. Water infiltration and redox processes.

Section 3. Soil formation

1. Soil forming factors: lithology, climate, relief, organisms and time. Soil-landscape relationships. Chronsequences and toposequences in Aragon.
2. Soil forming processes. Physical, chemical and biological weathering. Transformation and translocation. Additions and losses.

Section 4. Soil attributes and environmental quality

1. Physical attributes: structural stability, porosity, texture, plasticity, extensibility, etc. Impact on soil management.
2. Chemical attributes: pH, base saturation, main nutrients, organic matter, chelates, etc. Impact on soil management.
3. Biological properties: respiration, microbial biomass, qCO_2, enzyme activities. Indicators of environmental quality.
4. Soil quality facing degradation processes. Autodepuration and recuperation. Case studies in Aragón.

Practice sessions

1. Field work. Description of soil forming factors and landscape.
2. Field work. Soil sampling strategies. Profile sampling. Surface sampling. Undisturbed samples.
3. Lab work. Sampling conditioning prior to analysis. Drying, sieving and shredding.
4. Lab work. Soil salinity. Qualitative assessment of carbonates, sulphates and chloride.
5. Lab work. Soil pH and carbonate measurement.
6. Lab work. Particle size and texture.
7. Lab work. Soil organic matter and Munsell color.
8. Computer lab work. Soil classification by WRB.
9. Computer lab work. Showing and discussing analytical and morphological data.
10. Field trip. Soils of Aragon.

4.4. Course planning and calendar

The basic pattern for classroom and laboratory activities is composed by four weekly hours and four additional hours of personal study. Nevertheless, this pattern should be modified by non school days, field trips or by other academic activities. These changes will be announced in classroom and also through the Moodle e-learning campus.Further information concerning the timetable, classroom, office hours, assessment dates and other details regarding this course will be provided on the first day of class or please refer to the Faculty of Sciences website and Moodle.

4.5. Bibliography and recommended resources

BB Brady, Nyle C.. Elements of the nature and properties of soils / Nyle C. Brady, Ray R. Weil . 3rd ed. Upper Saddle River, NJ : Prentice Hall, cop. 2010

BB Brady, Nyle C.. The Nature and properties of soils / Nyle C. Brady, Ray R. Weil . - Rev. 14th ed. Upper Saddle River, N.J. : Pearson/Prentice Hall, cop. 2008

BB Porta Casanellas, Jaime. Agenda de campo de suelos : información de suelos para la agricultura y el medio ambiente / Jaume Porta Casanellas, Marta López-Acevedo Reguerín . Madrid : Mundi-Prensa, 2005

BB Porta Casanellas, Jaime. Edafología para la agricultura y el medio ambiente / Jaime Porta Casanellas, Marta López-Acevedo Reguerín, Carlos Roquero de Laburu . - 3ª ed., rev. y amp. Madrid [etc.] : Mundi-Prensa, 2003

BB Porta Casanellas, Jaime. Introducción a la edafología : uso y protección del suelo / Jaume Porta Casanellas, Marta López-Acevedo Reguerín, Rosa M. Poch Claret . Madrid, [etc.] : Mundi-Prensa, 2008

BC Aubert, Georges. La edafología : el suelo en el que vivimos / Georges Aubert, Jean Boulaine . Barcelona : Orbis, D.L.1986

BC Breemen, Nico van.. Soil formation / by Nico van Breemen and Peter Buurman. . 2nd ed. Dordrecht ; London : Kluwer Academic, cop. 2002

BC Buckman, Harry O.. Naturaleza y propiedades de los suelos : texto de edafología para enseñanza / Harry O. Buckman y Nyle c. Brady ; traduccido por R. Salord Barceló ; texto revisado por José Mª Vives de Quadras . Barcelona [etc.] : UTEHA, D.L. 1965

BC Cobertera Laguna, Eugenio. Edafología aplicada : Suelos, producción agraria, planificación territorial e impactos ambientales / Eugenio Cobertera Laguna . Madrid : Cátedra, 1993

BC Dingus, Del. Introductory soil science : laboratory manual / Del Dingus . Upper Saddle River : Prentice Hall, cop. 1999

BC Duchaufour, Philippe. Atlas ecológico de los suelos del mundo / por Philippe Duchaufour ; con la colaboración de Pierre Faivre, Michel Gury ; versión castellana de Ma. Tarsy Carballas Fernández. Barcelona : Toray-Masson, 1977

BC Duchaufour, Philippe. Edafología. Vol.1, Edafogénesis y clasificación / por Philippe Duchaufour; versión española de los doctores Mª Tarsy Carballas Fernández y Modesto Carballas Fernández . Barcelona : Masson, 1984

BC Duchaufour, Philippe. Manual de edafología / por Philippe Duchaufour ; versión española de los doctores Ma. Tarsy Carballas Fernández y Modesto Carballas Fernández . Barcelona [etc.] : Masson, 1987

BC Ferreras Chasco, Casildo. Biogeografía y edafogeografía / C. Ferreras Chasco, C. Fidalgo Hijano . [3ª reimp.] Madrid : Sintesis, D.L. 1991 (reimp. 2009)

BC FitzPatrick, E. A.. Suelos : su formación, clasificación y distribución / E.A. FitzPatrick ; [traducido por Antonio Marino Ambrosio] . - [1a. ed., 3a. reimp.] México : Compañía Editorial Continental, 1987

BC Kohnke , H., Franzmeier, D.P. (1995). Soil science simplified. Waveland Press

BC Kononova, M. M.. Materia orgánica del suelo : su naturaleza, propiedades y métodos de investigación / M. M. Kononova ; [traduccion castellana de Enriqueta Bordas de Muntan] . Barcelona : Oikos-Tau, D.L. 1981

BC Kubiëna, Walter L.. Claves sistemáticas de suelos : diagnóstico y sistemática ilustrados de los suelos más importantes de Europa con sus sinónimos más usuales / por W. L. Kubiëna ; traducido al español por Ángel Hoyos de Castro . Madrid : Consejo Superior de Investigaciones Científicas, 1952

BC López Ritas, Julio. El diagnóstico de suelos y plantas : (métodos de campo y laboratorio) / por Julio López Ritas y Julio López Melida. - 4ª ed., rev. y amp. Madrid : Mundi-Prensa, 1990

BC Palmer, Robert G.. Introductory soil science : laboratory manual / Robert G. Palmer, Frederick R. Troeh . 3rd ed. New York [etc.] : Oxford University Press, 1995

BC Pedraza Gilsanz, Javier de. Geomorfología : principios, métodos y aplicaciones / Javier de Pedraza Gilsanz ; colaboradores Rosa María Carrasco González...[et al.] . Alcorcón, Madrid : Rueda, D.L. 1996

BC Robinson, Gilbert Wooding. Los suelos : su origen, constitución y clasificación, introducción a la edafología / Gilbert Wooding Robinson ; traducción de la tercera edición inglesa por José Luis Amorós . 2ª ed. Barcelona : Omega, 1967

BC Soil genesis and classification / S.W. Buol ... [et al.] . 5th. ed. Ames, Iowa : Iowa State Press, 2003

BC Tan, Kim H.. Environmental soil science / Kim H. Tan . 3th. ed. Boca Raton : CRC press, cop. 2009

BC Tan, Kim H.. Principles of soil chemistry / Kim H. Tan . 3rd ed., rev. and expanded. New York [etc.] : Marcel

Dekker, cop. 1998

LISTADO DE URLs:

Clave para las Unidades de suelos de la FAO (1974)
[http://www.fao.org/soils-portal/soil-survey/clasificacion-de-suelos/leyenda-de-la-fao/es/]

Fotografías de perfiles de suelos
[http://jorgemataix.carbonmade.com/projects/47854#1]

International Union of Soil Sciences, IUSS
[http://www.iuss.org/]

Magdoff, F., Van Es, H. (2009): Building soils for better crops sustainable soil management. Sustainable Agriculture Research and Education (SARE)
[http://www.sare.org/content/download/841/6675/Building_Soils_For_Better_Crops.pdf]

Página de la USDA para usar y aprender su taxonomía (inglés)
[http://soils.usda.gov/]

Páginas de la Universidad de Granada con conceptos muy claros y sencillos y buenas fotos que los ejemplifican y aclaran
[http://edafologia.ugr.es/index.htm]

Reeuwijk, L.P. (2002). Procedures for soil analysis. International Soil Reference and Information Centre
[https://www.isric.org/sites/default/files/ISRIC_TechPap09.pdf]

Schoeneberger, P.J., Wysocki, D.A., Benham, E.C., Broderson, W.D. (1998). Libro de campaña para descripción y muestreo de suelos (Field book for describing and sampling soils). Centro Nacional de Relevamiento de Suelos, Servicio de Conservación de Recursos Naturales, Departamento de Agricultura de los EE.UU.
[https://ubvsuelos.files.wordpress.com/2011/09/libro-de-campac3b1a-usda.pdf]

Se explican e ilustran suelos difíciles de encontrar en nuestro entorno
[http://www.eweb.unex.es/eweb/edafo/]

Sociedad Española de la Ciencia del Suelo
[http://www.secs.com.es/]

World Soil Information
[http://www.isric.org/]

The updated recommended bibliography can be consulted in: http://psfunizar10.unizar.es/br13/egAsignaturas.php?id=10970