28904 - Geology, soil science and climatology

Información del Plan Docente

Academic Year	2018/19
Subject	28904 - Geology, soil science and climatology
Faculty / School	201 - Escuela Politécnica Superior
Degree	437 - Degree in Rural and Agri-Food Engineering
ECTS	6.0
Year	1
Semester	Half-yearly
Subject Type	Basic Education
Module	

1.General information

1.1.Aims of the course

1.2.Context and importance of this course in the degree

1.3.Recommendations to take this course

2.Learning goals

2.1.Competences

2.2.Learning goals

2.3.Importance of learning goals

3.Assessment (1st and 2nd call)

3.1.Assessment tasks (description of tasks, marking system and assessment criteria)

4.Methodology, learning tasks, syllabus and resources

4.1.Methodological overview

Learning methodology is based on a close relationship between the teachers and students. The teacher will explain the basic principles of geology and edaphology taking into account the level of students participation in the lecture. When participation is lower than required, the teacher will encourage it asking the students.

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4.2.Learning tasks

Learning activities are divided into the following ones:

1. Theorical lectures. The teacher will explain the basics of geology, edaphology and climatology.

2. Practical sessions related with the theorical lectures and with the aim of consolidate the explained content.

3. Fieldwork in the surroundings of Huesca to put into practice the acquired knowdlege to solve case studies.

4. Own working reports and learning

5. Cooperative learning by the development of a group report.

4.3.Syllabus

The subject is divided into two clearly thematic blocks: (1) Geology and (2) Edaphology/Climatology. The subject programme follows this division.

THEORICAL PROGRAMME

Geology

UNIT I. - INTRODUCTION

1. The Earth sciences.
2. The importance of geology to Food and Agricultural Engineering.
3. Geology as a science.
4. Stratigraphy (strata, fossils, evolution, historical geology).
5. Geological time.

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UNIT 2. - INTERNAL GEODYNAMICS AND PLATE TECTONICS

1. Geochemical structure and the composition of the Earth.
2. Plate tectonics.
3. Deformation of the crust: folds, faults, joints.

UNIT 3. - MINERALOGY.

1. Concepts of mineral and crystal.
2. Properties of minerals.
3. Classification of minerals.
4. Descriptive mineralogy.

UNIT 4. - PETROLOGY.

1. Concept of rock. Processes of rock formation.
2. Igneous rocks. Bowen's series. The most important igneous rocks.
3. Metamorphic rock. Metamorphic facies The most important metamorphic rocks.
4. Sedimentary rocks and their classification. The most important sedimentary rocks.

UNIT 5. - HYDROGEOLOGY

1. The water cycle.
2. Surface waters.
3. Underground waters.
4. Aquifers, Types. Hydraulic Conductivity. Transmissivity.
5. Darcy's law.
6. Water extraction methods.

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Edaphology

UNIT 1. - Introduction to Edaphology

1. The soil: concept and definition
2. Components of the soil
3. Factors of formation
4. Concern of the study of the soil
5. Edaphology as a science

UNIT 2. - The soil profile

1. Basic concepts: profile, horizon, pedión , polipedión
2. The pedion and the genetic horizons
3. Nomenclature of the genetic horizons.

UNIT 3. - Mineral components of the soil

1. The mineral fraction
2. Minerals of the soil
3. Silicated minerals
1. Phylosilicates: the clays
4. Non-silicated minerals
5. Stability of the minerals in the soil
1. Factors which affect stability
6. Origin of the minerals
7.

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Granulometric fractions

UNIT 4. - ORGANIC COMPONENTS OF THE SOIL

1. The organic matter of the soil: components
2. Organic content of the soil
3. Evolution of the organic matter in the soil
4. Properties of the organic matter in the soil
5. Humic substances
6. Types of humus
7. Organ-mineral compounds

UNIT 5. - PHYSICAL PROPERTIES OF THE SOIL

1. Texture
2. Structure
3. Porosity
4. Density
5. Consistency
6. Colour
7. Depth of soil
8. Water retention capacity
9. Movement of water in the soil

UNIT 6. - SOIL CHEMICAL PROPRIETIES

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1. Soil chemistry

2. Ion exchange capacity

3. Ions in soil solution. Base saturation theory

4. Soil reaction

Climatology

UNIT 1. - Fundamentals of climatology

1. The Earth in space
2. Reception and emission of radiant energy
3. Distribution of the energy
4. The atmosphere

PRACTICAL PROGRAMME

Geology practicals

Practical 1. - Visual recognition of minerals.

Practical 2. - Visual recognition of igneous, sedimentary and metamorphic rocks.

Practical 3. - Geological mapping. Dip and strike. Thickness.

Practical 4-8. - Development of geological cross-sections in horizontal, dipping and folded strata.

Edaphology Practicals

Practical 1: Taking field samples.

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Practical 2: Sample preparation. Sieved, calculation of fine and thick fractions.

Practical 3: Effects of the structure of the soil.

Practical 4: Soli colour.

Practical 5: Soil texture

Practical 6: Soil chemical test on structural stability

Practical 7-8: Open laboratory for group work in the examination and determination of soil core samples

Climatology Practical

- Practical 1: Consequences of atmospheric dynamics, information and prediction.

FIELDWORK

During the first or second week of December, it si compulsory to attend to a full-day fieldtrip in the surroundings of Huesca. The final date of fieldtrip will be communicated to the students during the theorical lectures and in the digital Moodle Platform. The first part deals with hydrogeological problems that may arise on farming activities while the second part is focused on the identification, description and classification of soils.

ONLINE COURSE

During October, the student is asked to carry out a Bibliography search online course in collaboration with the library staff.

GROUP REPORT

The students in groups of two/three people must study a soil cut, describing its main properties and identifying horizons.

4.4.Course planning and calendar

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Tipo actividad / Semana	1 17-23 sep	2 24-30 sep	3 1-7 oct	4 8-14 oct	5 15-21 oct	6 22-28 oct	7 29 oct-4 nov	8 5-11 nov	9 12-18 nov	10 19-25 nov	11 26 nov-2 dic	12 3-9 dic	13 10-16 dic	14 17-23 dic	15 24-31 dic	16 31 dic-6 ene	17 7-13 ene	18 14-20 ene	19 21-27 ene	20 28 ene-3 feb	21 4-10 feb	Total
				Festivo 12 oct (vie) No lectivo 11 oct (jue)			Festivo 1 nov (jue)		Festivo 16 nov (vie)			Festivos 6 (jue) y 8 (sab) No lectivo 7 (vie)		Vac. Navidad desde 21 dic (vie)	Vac. Navidad	Vac. Navidad hasta 6 ene (dom)		Fin clases Semestre 1: 16 ene (mier). Comienzo exam 17 ene (jue)	Festivo 23 ene (mar)		Fin exam 9 feb (sab)	
Actividad Presencial																						60
Teoría	2	2	2	2	2		2	2	2	2	2	2	2	2		2						28
Problemas				2	2	2	2	2	2	2	2	2	2	2		2						24
Prácticas laboratorio	2	2																				4
Trabajos en grupo																						0
Salidas de prácticas																						0
Tutorías ECTS																						0
Evaluación																			4			4
Actividad No presencial																						90
Trabajo individual:	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	6,5	5	6	5			82,5
Trabajo en grupo										1,5	1,5	1,5	1,5	1,5								7,5
TOTAL	8	8	8	8	6	8	8	8	9,5	9,5	9,5	9,5	9,5	4	6,5	9	6	9				150

4.5.Bibliography and recommended resources

BB	Brady, Nyle C.. Elements of the nature and properties of so Nyle C. Brady, Ray R. Weil . 3rd ed. Upper Saddle River, N Prentice Hall, cop. 2010
BB	Breemen, Nico van.. Soil formation / by Nico van Breemen Peter Buurman. 2nd ed. Dordrecht ; London : Kluwer Acad cop. 2002
BB	Porta Casanellas, Jaime. Introducción a la edafología : usc protección del suelo / Jaume Porta Casanellas, Marta López-Acevedo Reguerín, Rosa M. Poch Claret Madrid, [et

Universidad Zaragoza

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	Mundi-Prensa, 2008
BB	Press, Frank. Earth / Frank Press, Raymond Siever . 4th ed rep. New York : W.H. Freeman and Company, cop. 1986 (r 20??)
BB	Tarbuck, Edward J.. Ciencias de la tierra : una introducción geología física / Edward J. Tarbuck, Frederick K. Lutgens ; ilustrado por, Dennis Tasa; traducción AMR Traducciones científicas; revisión técnica y adaptación, Manuel Pozo Rodríguez, José Manuel González Casado . 8ª ed. Madrid Prentice Hall, D.L. 2005
BB	Understanding earth / Frank Press ... [et al.] . 4th ed New Y W.H. Freeman, [2003]
BB	Wicander, Reed. Fundamentos de geología / Reed Wicand James S. Monroe ; [traducción, Enrique Palos ; revisión téc Javier Arellano Gil] . 2a. ed. México [etc.] : International Th Editores, 2000
BC	Anguita Virella, Francisco. Biografía de la tierra : historia de planeta singular / Francisco Enguita . 1a. ed. Madrid : Agui 2002
BC	Anguita Virella, Francisco. Origen e historia de la Tierra / Francisco Anguita Virella . Alcorcón, Madrid : Rueda, D.L.
BC	Aubert, Georges. La edafología : el suelo en el que vivimos Georges Aubert, Jean Boulaine . Barcelona : Orbis, D.L.19
BC	Bloom, Arthur L.. La superficie de la tierra / Arthur L. Bloom [traducido por Juan Carlos M. Turner] . [2a. ed.] Barcelona Omega, D.L. 1981
BC	Brady, Nyle C.. The Nature and properties of soils / Nyle C Brady, Ray R. Weil . - Rev. 14th ed. Upper Saddle River, N Pearson/Prentice Hall, cop. 2008
BC	Buckman, Harry O.. Naturaleza y propiedades de los suelo texto de edafología para enseñanza / Harry O. Buckman y Brady ; traducido por R. Salord Barceló ; texto revisado po 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 : Cátedr 1993
BC	Dingus, Del. Introductory soil science : laboratory manual / Dingus . Upper Saddle River : Prentice Hall, cop. 1999
BC	Duchaufour, Philippe. Atlas ecológico de los suelos del mu por Philippe Duchaufour ; con la colaboración de Pierre Fa 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 d doctores Mª Tarsy Carballas Fernández y Modesto Carball 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 . Bar [etc.] : Masson, 1987
BC	Ferreras Chasco, Casildo. Biogeografía y edafogeografía / Ferreras Chasco, C. Fidalgo Hijano . [3ª reimp.] Madrid : Si D.L. 1991 (reimp. 2009)
BC	FitzPatrick, E. A.. Suelos : su formación, clasificación y distribución / E.A. FitzPatrick ; [traducido por Antonio Marin

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	Ambrosio] . [1a. ed., 3a. reimp.] México : Compañía Editori Continental, 1987
BC	Gutiérrez Elorza, Mateo. Geomorfología climática / Mateo Gutiérrez Elorza . Barcelona : Omega, 2001
BC	Kohnke, H. (1995). Soil science simplified. Illinois: Wavelan Press
BC	Kononova, M. M.. Materia orgánica del suelo : su naturalez propiedades y m étodos 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 : diagnó sistemática ilustrados de los suelos más importantes de Eu con sus sinónimos más usuales / por W. L. Kubiëna ; tradu español por Ángel Hoyos de Castro . Madrid : Consejo Sup de Investigaciones Científicas, 1952
BC	López Ritas, Julio. El diagnóstico de suelos y plantas : (mé de campo y laboratorio) / por Julio López Ritas y Julio Lópe Melida. 4ª ed., rev. y amp. Madrid : Mundi-Prensa, 1990
BC	Palmer, Robert G.. Introductory soil science : laboratory ma Robert G. Palmer, Frederick R. Troeh . 3rd ed. New York [e Oxford University Press, 1995
BC	Pedraza Gilsanz, Javier de. Geomorfología : principios, mé y aplicaciones / Javier de Pedraza Gilsanz ; colaboradores María Carrasco González...[et al.] . Alcorcón, Madrid : Rue D.L. 1996
BC	Porta Casanellas, Jaime. Agenda de campo de suelos : información de suelos para la agricultura y el medio ambien Jaume Porta Casanellas, Marta López-Acevedo Reguerín Madrid : Mundi-Prensa, 2005
BC	Porta Casanellas, Jaime. Edafología para la agricultura y e medio ambiente / Jaime Porta Casanellas, Marta López-Ac Reguerín, Carlos Roquero de Laburu . - 3ª ed., rev. y amp. Madrid [etc.] : Mundi-Prensa, 2003
BC	Rice, Roger John. Fundamentos de geomorfología / R.J. R [traducido por Guillermo Meléndez Hevia, María Pilar Villar Saldaña ; revisado por Mateo Gutierrez Elorza] . Madrid : Paraninfo, 1983
BC	Robinson, Gilbert Wooding. Los suelos : su origen, constitu clasificación, introducción a la edafología / Gilbert Wooding Robinson ; traducción de la tercera edición inglesa por Jos Amorós . 2ª ed. Barcelona : Omega, 1967
BC	Seibold, Eugen. The sea floor : an introduction to marine g / E. Seibold, W.H. Berger. . 3rd edition. Berlin [etc.] : Springer-Verlag, cop. 1996
BC	Selby, M.J.. Earth's changing surface : an introduction to geomorphology / M.J. Selby . Oxford : Clarendon Press, 19
BC	Soil genesis and classification / S.W. Buol ... [et al.] . 5th. e Ames, Iowa : Iowa State Press, 2003
BC	Strahler, Arthur N.. Geografía física / Arthur n. Strahler, Ala Strahler ; [trad. por Marta Barrutia y Pere Sunyer] . - 3ª ed. reimp. Barcelona : Omega, cop. 1989 (reimp. 2005)
BC	Tan, K.H. (2009). Environmental soil science. Boca Raton: Press

LISTADO DE URLs:

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Agencia Estatal de Meteorología, AEMET
[http://www.aemet.es/es/portada]
Fotografías de perfiles de suelos
[http://jorgemataix.carbonmade.com/projects/47854]
Instituto Geológico y Minero de España, IGME
[http://www.igme.es/]
International Union of Soil Science, IUSS
[http://www.iuss.org/]
Leyenda de mapas de suelos del mundo de la FAO/UNES
[http://www.fao.org/soils-portal/levantamiento-de-suelos/cla
Página de la USDA para usar y aprender su taxonomía, en
[http://soils.usda.gov/]
Páginas de la Universidad de Granada con conceptos muy
y sencillos y buenas fotos que los ejemplifican y aclaran
[http://edafologia.ugr.es/index.htm]
Se explican e ilustran suelos difíciles de encontrar en nues
entorno
[http://www.unex.es/edafo/]
Sociedad Española de la Ciencia del Suelo, SECS
[http://www.secs.com.es/]
This dynamic Earth on-line, USGS
[http://pubs.usgs.gov/gip/dynamic/dynamic.html]
United States Geological Survey
[http://www.usgs.gov/]
World Soil Information, ISRIC
[http://www.isric.org/]

The updated recommended bibliography can be consulted in:
http://psfunizar7.unizar.es/br13/egAsignaturas.php?id=2217