



Teaching Guide				
Identifying Data			2015/16	
Subject (*)	Edafoloxía	Code	610G02045	
Study programme	Grao en Bioloxía			
Descriptors				
Cycle	Period	Year	Type	Credits
Graduate	2nd four-month period	Fourth	Optativa	6
Language	Spanish			
Teaching method	Face-to-face			
Prerequisites				
Department	Ciencias da Navegación e da Terra			
Coordinador	Paz Gonzalez, Antonio	E-mail	antonio.paz.gonzalez@udc.es	
Lecturers	Paz Gonzalez, Antonio Vidal Vázquez, Eva	E-mail	antonio.paz.gonzalez@udc.es eva.vidal.vazquez@udc.es	
Web				
General description	The program of Soil Science focusses on: a) the study of the organic and mineral soil composition, b) soil physical and chemical and biological properties, c) ecological relevance of soil functions.			

Study programme competences / results	
Code	Study programme competences / results
A1	Recoñecer distintos niveis de organización nos sistemas vivos.
A2	Identificar organismos.
A6	Catalogar, avaliar e xestionar recursos naturais.
A18	Levar a cabo estudos de produción e mellora animal e vexetal.
A20	Muestrear, caracterizar e manexar poboacións e comunidades.
A21	Deseñar modelos de procesos biolóxicos.
A22	Describir, analizar, avaliar e planificar o medio físico.
A23	Avaliar o impacto ambiental. Diagnosticar e solucionar problemas ambientais.
A24	Xestionar, conservar e restaurar poboacións e ecosistemas.
A25	Desenvolver e aplicar técnicas de biocontrol.
A26	Deseñar experimentos, obter información e interpretar os resultados.
A27	Dirixir, redactar e executar proxectos en Bioloxía.
A28	Desenvolver e implantar sistemas de xestión relacionados coa Bioloxía.
A29	Impartir coñecementos de Bioloxía.
A30	Manexar adecuadamente instrumentación científica.
A31	Desenvolverse con seguridade nun laboratorio.
A32	Desenvolverse con seguridade no traballo de campo.
B1	Aprender a aprender.
B2	Resolver problemas de forma efectiva.
B3	Aplicar un pensamento crítico, lóxico e creativo.
B4	Traballar de forma autónoma con iniciativa.
B5	Traballar en colaboración.
B6	Organizar e planificar o traballo.
B7	Comunicarse de maneira efectiva nunha contorna de traballo.
B8	Sintetizar a información.
B9	Formarse unha opinión propia.
B10	Exercer a crítica científica.
B11	Debater en público.
B12	Adaptarse a novas situacións.
B13	Comportarse con ética e responsabilidade social como cidadán e como profesional.



C1	Expresarse correctamente, tanto de forma oral coma escrita, nas linguas oficiais da comunidade autónoma.
C2	Dominar a expresión e a comprensión de forma oral e escrita dun idioma estranxeiro.
C3	Utilizar as ferramentas básicas das tecnoloxías da información e as comunicacións (TIC) necesarias para o exercicio da súa profesión e para a aprendizaxe ao longo da súa vida.
C4	Desenvolverse para o exercicio dunha cidadanía aberta, culta, crítica, comprometida, democrática e solidaria, capaz de analizar a realidade, diagnosticar problemas, formular e implantar solucións baseadas no coñecemento e orientadas ao ben común.
C5	Entender a importancia da cultura emprendedora e coñecer os medios ao alcance das persoas emprendedoras.
C6	Valorar criticamente o coñecemento, a tecnoloxía e a información dispoñible para resolver os problemas cos que deben enfrontarse.
C7	Asumir como profesional e cidadán a importancia da aprendizaxe ao longo da vida.
C8	Valorar a importancia que ten a investigación, a innovación e o desenvolvemento tecnolóxico no avance socioeconómico e cultural da sociedade.

Learning outcomes			
Learning outcomes	Study programme competences / results		
Because of the role of the soil for terrestrial ecosystems, Edaphology has a particular interest in Environmental Biology. The soil food chain describes a complex living system and how it interacts with the environment, plants, and animals. The nature of soil makes direct observation of food webs difficult. Soil microbial communities are characterized in many different ways. The activity of microbes can be measured by their respiration and carbon dioxide release. The cellular components of microbes can be extracted from soil and genetically profiled, or microbial biomass can be calculated by weighing the soil before and after fumigation.	A21	B1	C3
	A28	B8	C6
	A29	B10	C7
	A30	B11	
	A31		
	A32		
The course of Soil Science is designed to provide an overview of the fundamental: Physical processes, Chemical processes, Fertility, Biology, and Land Use. Both theoretical and practical contents in soil science should contribute to enhance the skills of Biology students at the UDC in the use of several instrumental techniques.	A2	B2	C1
	A6	B7	C5
	A25	B12	C8
	A27	B13	
The scientific study of the soil is important for Biologists, mainly from an ecological perspective. Soil is essential in environmental studies and soil science contributes to understand important processes such as biogeochemical cycles, the structure ecosystems and factors from which primary production depends.	A6	B3	C1
	A22	B4	C5
	A23	B10	
	A30		
	A31		
Soils act as substrates for vegetal communities and also as adsorbent and absorbent for nutritive, and allow life of many animal and vegetal organisms. Therefore our program pays particular attention to the ?edaphosphere? as a complex dynamic and organised site, located in the interface between biosphere, lithosphere, hydrosphere and atmosphere. Soil is also the support of man-made spaces or sites influenced by man activity, such as urban-industrial areas and transport infrastructures.	A1	B1	C1
	A6	B9	C5
	A18	B10	C6
	A20		
	A22		
	A23		
El suelo actúa como sustrato de las comunidades vegetales, adsorbente y absorbente de los elementos nutritivos, es decir soporta la vida de numerosos organismos vegetales y animales. Por tanto, se presta particular atención al análisis de la edafosfera como un medio organizado, complejo y dinámico, en la zona de contacto entre la biosfera, la litosfera, la hidrosfera y la atmósfera.	A6	B2	C2
	A20	B5	C4
	A26	B6	C6
	A27	B9	C7

Contents	
Topic	Sub-topic



<p><b>PRELIMINARY CONCEPTS</b></p> <p>Lesson 1.- History of Soil Science.</p> <p>Lesson 2.- Soil descripton in field conditions. Laboratory techniques for soil studies.</p>	<p>Origin and development of Soils Science. Main topics in Soil Science.</p> <p>Profile and horizons. Physical, Chemical and Bioñogical methods of soil analysis.</p>
<p><b>SOIL COMPOSITION</b></p> <p>Lesson 3.- Soil mineral composition. Soil clays.</p> <p>Lesson 4.- Soil organic matter.</p>	<p>Soil texture. Specific surface. Soil mineralogy. Soil clays. Structure and properties of most common soil clays. Oxyhydroxides.</p> <p>Soil organic compounds. Humus. Organo-mineral associations. Organic matter and ecosystems: biogeochemical cycles.</p>
<p><b>SOIL PROPERTIES</b></p> <p>Lesson 5.- Soil physical properties and soil structure. Lesson 6.- Soil water retention and water dynamics. Lesson 7.- Soil temperature and aeration.</p> <p>Lesson 8.- Soil pH and cation exchange capacity.</p> <p>Lesson 9.- Soil biology.</p> <p>Lesson 10. Soil fertility</p>	<p>Bulk density and solid density. Soil porosity. Pore-size distribution. Aggregate dynamics in soils. Structural stability.</p> <p>Soil moisture content and soil potential. Soil water measurement. Soil moisture characteristic curve. Soil water retention and soil water dynamics. Soil water and water requirements of vegetation.</p> <p>Soil thermal properties. Soil temperature management. Composition of the soil atmosphere. Soil and gases of greenhouse effect.</p> <p>Soil pH and soil acidity. Soil acidity effects. Acidity amendment. Exchange complex of soils. Cation exchange capacity.</p> <p>Soil organisms. Soil enzymatic activity. Nucleic acids in soil. Soil organism and soil properties as indicators of soil quality.</p> <p>Macronutrients and micronutrients. Nitrogen , phosphorus and potassium cycles. Calcium and magnesium. Iron, copper, zinc, boron and molybdenum. Other oligoelements</p>
<p><b>FACTORS AND PROCESSES OF SOIL FORMATION</b></p> <p>Lesson 11.- Factors of soil fromation.</p> <p>Lesson 12.- Processes of soil formation.</p>	<p>Parent material. Climate. Topography. Times Vegetations and organisms.</p> <p>Anthropogenic factors.</p> <p>Soil profile differentiation. Clay accumulation. Podzolization. Salinization. Calcification. Hydromorphic processes. Ferralitic alteration.</p>



<p><b>SOIL SYSTEMATICS AND CLASSIFICATION</b>          Lesson 13.- Soil Systematics.          Lesson 14.- Introduction to Soil Taxonomy.          Lesson 15.- World Reference Base for Soil Resources.          Lesson 16.- Spanish and Galician Soils.</p>	<p>Genesis and diagnostic horizons. Soil profile. Horizon nomenclature.          Modern Soil Classifications. Soil Taxonomy. World Reference Base for Soil Resources.</p> <p>Characteristics for soil diagnosis. Moisture and temperature regimes. Orders, suborders, great groups, subgroups, families, and series.</p> <p>Organic soil. Soil with anthropic influences. Soils conditioned by topography and by time. Soils conditioned by cold, temperate, steppe, arid or semiarid and tropical or subtropical climates.</p> <p>Soil under Atlantic climate. Soils under Mediterranean climate. Galician soils: parent material, climate, topography and vegetation effects.</p>
<p><b>APPLIED SOIL SCIENCE</b>          Lesson 17.- Applications of Soil Science.</p>	<p>Soil cartography.          Interactions soil-landscape.          Soil functions and society.          Soil and environment.          Soil contamination.          Recovery of contaminated soils.          Soil Use and Management.</p>
<p><b>PRACTICAL ACTIVITIES</b>          Laboratory work           Field studies</p>	<p>Textural analysis          Bulk density and solid density, Porosity.          Aggregate stability          Soil pH.          Organic carbon and nitrogen          Cation exchange capacity          Soil extractable phosphorus          Biological activity and dehydrogenase activity</p> <p>Case studies: Umbrisols, Cambisols, Fluvisols, and Gleysols</p>
<p><b>TRABAJOS TUTELADOS</b></p>	<p>La erosión como fuente de contaminación difusa          Mecanismos y procesos de erosión hídrica bajo clima atlántico          Efecto de los incendios forestales en la degradación del suelo          Contaminación por actividades mineras          Contaminación por actividades ganaderas          Los vertederos y la contaminación del suelo          Contaminantes orgánicos          Indicadores físico-químicos de la calidad del suelo          Indicadores biológicos de la calidad del suelo          Suelos de viñedo en Galicia          Fertilización excesiva por purines          Riesgo de Compactación          Balance hídrico del suelo          Metales pesados en suelos</p>

Planning				
Methodologies / tests	Competencies / Results	Teaching hours (in-person & virtual)	Student?s personal work hours	Total hours



Guest lecture / keynote speech	A1 A6 A22 A25 B1 B3 B9 B13 C4 C7	20	40	60
Objective test	A23 A24 B2 B8 B10 C1	1	1	2
Laboratory practice	A2 A20 A21 A26 A27 A30 A31 B4 B5 B12 C3	15	30	45
Supervised projects	A1 A18 A28 A29 B6 B7 B11 C2 C5 C6 C8	4	20	24
Field trip	A2 A26 A29 A32 B9 B10 C5	5	10	15
Introductory activities	A6 A27 A29 B1	1	2	3
Personalized attention		1	0	1

(\*)The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

Methodologies	
Methodologies	Description
Guest lecture / keynote speech	The contents of soil science will be developed. The used audiovisual materials will be provided to students.
Objective test	Short questions about keynote speech contents
Laboratory practice	Analysis of basic soil physical, chemical and biological properties.
Supervised projects	These are guided and supervised academic activities
Field trip	The main soil types in Galicia will be observed.
Introductory activities	Outline of the program, highlighting the main interesting issues for Biologists

Personalized attention	
Methodologies	Description
Introductory activities	Personalized attention will be provided by individual meetings in dates previously selected.

Assessment			
Methodologies	Competencies / Results	Description	Qualification
Field trip	A2 A26 A29 A32 B9 B10 C5	Assessment of field activities and reports of filed work.	8
Supervised projects	A1 A18 A28 A29 B6 B7 B11 C2 C5 C6 C8	Quality of the reports and presentations.	20
Introductory activities	A6 A27 A29 B1	This issue will be assessed together with keynote speech.	2
Guest lecture / keynote speech	A1 A6 A22 A25 B1 B3 B9 B13 C4 C7	Short questions and tests about the keynote speech. Final examination and also partial examinations, if requested.	60
Laboratory practice	A2 A20 A21 A26 A27 A30 A31 B4 B5 B12 C3	Continuous assessment and practical work.	10

Assessment comments



## Soil

Science global note can be assessed by continuous evaluation following Bolonia criteria.

Evaluations may be

performed not only in English, but also in Galician or Spanish languages, if this is requested by students.

### Sources of information

<b>Basic</b>	- HARPSTEAD, M. I., SAUER, T. J and NENNET, W. F (2001). HARPSTEAD, M. I., SAUER, T. J and NENNET, W. F. CAB Publishers PORTA CASANELLAS, J. LÓPEZ AVEVEDO, M y ROQUERO, C. 2003. Edafología para la agricultura y el medio ambiente. Ediciones Mundi-Prensa.960 pp.PORTA CASANELLAS, J. LÓPEZ AVEVEDO, M y POCH, R.M. 2008. Introducción a la Edafología: uso y protección del suelo. Ediciones Mundi-Prensa. 451 pp. WRB. 2006. World Referente Base for Soil Resources. Wageningen/Roma. LAL, R. (2002). Encyclopedia of Soil Science. Marcel Dekker.
<b>Complementary</b>	- EASH, N., &; GREEN, C. J., et al (2008). Soil Science simplified. Wiley Recursos web: <a href="http://www.iuss.org">www.iuss.org</a> <a href="http://www.edafologia.ugr.es">www.edafologia.ugr.es</a> <a href="http://www.soilerosion.net">www.soilerosion.net</a> Mapas de suelos de las cuatro provincias de Galicia y diversas provincias de España

### Recommendations

#### Subjects that it is recommended to have taken before

Xeoloxía/610G02004

Xeografía: Xeografía física/610G02006

#### Subjects that are recommended to be taken simultaneously

#### Subjects that continue the syllabus

#### Other comments

(\*)The teaching guide is the document in which the URV publishes the information about all its courses. It is a public document and cannot be modified. Only in exceptional cases can it be revised by the competent agent or duly revised so that it is in line with current legislation.