Teaching Guide				
Identifying Data				2022/23
Subject (*)	Edaphology		Code	610G02045
Study programme	Grao en Bioloxía			
Descriptors				
Cycle	Period	Year	Type	Credits
Graduate	2nd four-month period	Fourth	Optional	6
Language	English			
Teaching method	Face-to-face			
Prerequisites				
Department	Física e Ciencias da Terra			
Coordinador	Paz Gonzalez, Antonio	E-mail	antonio.paz.gonzalez@udc.es	
Lecturers	, Lado Liñares, Marcos López Vicente, Manuel Paz Gonzalez, Antonio Vidal Vázquez, Eva	E-mail	eliana.cardenas@col.udc.es marcos.lado@udc.es manuel.lopez.vicente@udc.es antonio.paz.gonzalez@udc.es eva.vidal.vazquez@udc.es	
Web				
General description	The program of Soil Science focuses 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	
Code	Study programme competences
A6	Catalogar, avaliar e xestionar recursos naturais.
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.
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.
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.
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.

Learning outcomes	
Learning outcomes	Study programme competences

Assessment of environmental impact taken into account soil diversity. Evaluation of soil contamination and techniques for soil restoration.	A6 A22		
Assessment of environmental impact taken into account soil diversity. Evaluation of soil contamination and techniques for soil restoration.	A21 A26	B1 B3	
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.	A21 A22 A30	B2	
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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.	A22 A24 A28 A30 A32	B11	
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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.	A27 A30 A31	B8 B10	
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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.	A24 A28 A31	B1	
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Contents	
Topic	**Sub-topic**

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

V SOIL SYSTEMATICS AND CLASSIFICATION Lesson 13.- Soil Systematics. Lesson 14.- Introduction to Soil Taxonomy. Lesson 15.- World Reference Base for Soil Resources. Lesson 16.- Spanish and Galician Soils.	Genesic and diagnostic horizons. Soil profile. Horizon nomenclature. Modern Soil Classifications. Soil Taxonomy. World Reference Base for Soil Resources. Characteristics for soil diagnosis. Moisture and temperature regimes. Oreders, suborders, great groups, subgroups, families, and series. 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. Soil under Atlantic climate. Soils under Mediterranean climate. Galician soils: parent material, climate, topography and vegetation effects.
VI APPLIED SOIL SCIENCE Lesson 17.- Applications of Soil Science.	Soil cartography. Interactions soil-landscape. Soil functions and society. Soil and environment. Soil contamination. Recovery of contaminated soils. Soil Use and Management.
PRACTICAL ACTIVITIES Laboratory work Field studies	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 Case studies: Umbrisols, Cambisols, Fluvisols, and Gleysols

SUPERVISED PROJECTS	Soil erotion as a source of diffuse pollution Mechanisms and processes of water erosion under an Atlantic climate Effect of forest fires in soil degradation Mining and soil contamination Livestock farming and soil contamination Landfills and soil contamination Organic pollutants Physical-chemical indicators of soil quality Biological indicators of soil quality Vineyard soil in Galicia Excessive soil fertilisation with slurry Soil compactation risks Hydric balance in soils Heavy metals in soils

Planning				
Methodologies / tests	Competencies	Ordinary class hours	Student?s personal work hours	Total hours
Guest lecture / keynote speech	A6 A21 A22 A23 A24 A31 B2 B7 B8 B9 B11	21	40	61
Supervised projects	A20 A26 A27 A28 A30 A32 B1 B3 B6 B10 B12	7	16	23
Field trip	A20 A23 B3 B6	4	10	14
Laboratory practice	A6 A20 A21 B8 B10	14	28	42
Personalized attention		10	0	10
(*)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.
Supervised projects	These are guided and supervised academic activities
Field trip	The main soil types in Galicia will be observed.
Laboratory practice	Asessement of main physical, chemical and biological properties of soils

Personalized attention	
Methodologies	Description
Supervised projects Laboratory practice Field trip	Personalized attention will be provided by individual meetings in dates previously selected.

Assessment			
Methodologies	Competencies	Description	Qualification
Supervised projects	A20 A26 A27 A28 A30 A32 B1 B3 B6 B10 B12	Quality of the reports and presentations.	30
Laboratory practice	A6 A20 A21 B8 B10	Continuous assessment and practical work.	15
Field trip	A20 A23 B3 B6	Assessment of field activities and reports of filed work.	5

Guest lecture / keynote speech	A6 A21 A22 A23 A24 A31 B2 B7 B8 B9 B11	Short questions and tests about the keynote speech. Final examination and also partial examinations, if requested.	50

Assessment comments
Soil Science global grade can be assessed by continuous evaluation following the Bologna criteria. Evaluations may be performed not only in English, but also in Galician or Spanish, if requested by the students.

Sources of information	
Basic	LAL, R. 2002. Encyclopedia of Soil Science. Marcel Dekker.PORTACASANELLAS, J. LÓPEZ AVEVEDO, M y ROQUERO, C. 2003. Edafología para la agricultura y el medio ambiente. Ediciones Mundi-Prensa.960 pp.PORTACASANELLAS, J. LÓPEZ AVEVEDO, M y POCH, R.M. 2008. Introducción a la Edafologia: uso y protección del suelo. Ediciones Mundi-Prensa. 451 pp. WRB. 2006. World Referente Base for Soil Resources. Wageningen/Roma.
Complementary	Recursos web:www.iuss.orgwww.edafologia.ugr.eswww.soilerosion.netMapas de suelos de las cuatro provincias de Galicia y diversas provincias de España

Recommendations
Subjects that it is recommended to have taken before
Geology/610G02004 Physical Geography/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.