Universidad Zaragoza

Academic Year/course: 2022/23

25260 -

Syllabus Information

Academic Year: 2022/23
Subject: 25260 -
Faculty / School: 201 - Escuela Politécnica Superior
Degree: 571 - Degree in Environmental Sciences
ECTS: 5.0
Year:
Semester: Second Four-month period
Subject Type: Optional
Module:

1. General information

1.1. Aims of the course

The overall objective of the subject is for students to understand the dynamics of nutrient cycles and their relationship with the fertility of ecosystems through knowledge of the soil and soil-plant relationships; and the interpretation and analysis of the operation of these relationships and soil properties under very specific management conditions, such as the use of certain by-products.

The student must be able to apply the basic scientific principles to the management and recycling of organic waste so that he can use it in the development of his professional activity, applying the most appropriate technologies to the environment.

These goals are aligned with some of the Sustainable Development Goals of the 2030 Agenda and certain targets, specifically goal 11, target 11.6. By 2030, reduce the per capita negative environmental impact of cities, including by paying special attention to air quality and municipal and other waste management.

The proposed objectives are also related to objective 12, target 12.2, 12.4, 12.6 By 2030, achieve sustainable management and efficient use of natural resources, achieve environmentally sound management of chemical products and all waste to throughout its life cycle, in accordance with agreed international frameworks, and significantly reduce its release to the atmosphere, water and soil in order to minimize its adverse effects on human health and the environment and significantly reduce the generation of waste through prevention, reduction, recycling and reuse activities.

2. Learning goals

2.3. Importance of learning goals

The multidisciplinary nature of the subject will enable the student to relate knowledge from other subjects and develop professional skills. Likewise, the student will be able to analyze and synthesize information, apply theory to practice, solve practical questions and problems, organize and plan, as well as generate new ideas to work both individually and in groups.

3. Assessment (1st and 2nd call)

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

Global evaluation is carried out. In each call the evaluation will consist of three activities:
1. Global test written at the end of the semester, according to the syllabus of the subject and according to the EPS exam schedule (60% of the final grade)
2. Participation in practices and written presentation of a memory in those in which it is indicated (20% of the final grade)
3. Written presentation of a course work (20% of the final grade)
Activities 2 and 3 can be carried out and it is recommended, on the dates established at the beginning of the course.
All those students who do not attend the practices or do not present the report on the agreed date (or who wish to raise their grade), must take an individual written test, the same day that appears in the EPS exam calendar, which It will deal with the contents of the laboratory practices and/or the topic proposed for the course work.
The evaluation system seeks to contemplate the acquisition of knowledge, skills and aptitudes of the subject. Participation will be valued as well as the content, presentation and formal correction of the proposed activities. In the evaluation of the practical program, not only the ability to apply theoretical content will be taken into account, but also the application of the attitudes considered in the section on specific competences when solving the cases raised. To pass the entire subject, it is necessary to obtain a grade equal to or greater than 5 in activity 1, and only then can it be averaged with the others. Activities 2 and 3, once passed (score equal to or greater than 5 out of 10) are kept, with that score, and will average with activity 1 in the call that the latter is passed.

In relation to the ODSs and in particular to targets 12.4 and 12.5, the theoretical foundation for the environmentally sound management of all waste throughout its life cycle and the reduction, recycling and reuse of organic waste is evaluated in the testtheory, in the practice reports or in the course work.The contribution of these three activities represents 60%, 20% and 20% of the grade, representing 100% of the student's global classification.

Success rates in previous courses

2018/2019	2019/2020	2020/2021
100 %	-	100 %

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 theory and problem sessions, group work, seminars, laboratory sessions and fieldwork.

The teaching methodology used in the course will be based on the model of lecture to address the basic theoretical concepts of the subject. On the other hand, various problems and practical cases will be solved in the classroom which will allow students to relate the theoretical concepts and see their application.

4.2. Learning tasks

Theoretical dissertation, practical sessions, written coursework, and formal examinations related to the use of organic waste as a fertilizer.

4.3. Syllabus

This course will address the following topics:

Lectures

SECTION 1: SOIL FERTILITY AND GENERAL ASPECTS

1. Introduction: The problem of the generation of by-products in human activities.
2. Planning of the application of waste to the soil: Limitations, advantages and undesirable effects.
3. Soil quality. Concept, definitions and management.
4. Soil fertility: M.O. and primary mineral nutrients.

SECTION 2: SPECIFIC CYCLES, INTEREST AND CONSIDERATIONS ON WASTE
1. Generation and destination of waste. General aspects and definitions
2. Cycle of the secondary elements, Ca, Mg, Na and K. Importance in the soil. Need and effects for plants.
3. Cycle of microelements. Importance in the soil. Need and effects for plants.
4. Heavy metals in the soil. Origin and accumulation. Effects on plants.
5. Waste management for agriculture. Applicable regulations.
6. Interest and restrictions in the use of waste from industrial or extractive activities. Main features. Agronomic interest.
7. Interest and restrictions in the use of waste from urban and leisure activities. Main features. Agronomic interest.
8. Interest and restrictions in the use of waste from livestock activities. Main features. Agronomic interest.
9. Interest and restrictions in the use of waste from agricultural, forestry and agri-food activities. Main features. Agronomic interest.
10. Transport and distribution of waste. Application techniques. Incorporation into the soil

Practice sessions

SECTION 1: SOIL FERTILITY AND GENERAL ASPECTS
- Assessment of the intrinsic edaphic parameters and identification of possible impacts derived from extrinsic properties to the soil.
- Characterization of organic waste
? C cycle (total organic matter, particulate organic matter, soluble organic carbon, oxidizable organic carbon and recalcitrant organic C)
? Determination of the degree of stability of an organic residue.

SECTION 2: SPECIFIC CYCLES, INTEREST AND CONSIDERATIONS ON WASTE
? Use of by-products in agriculture. Discussion of cases.
? Economy of the use of by-products such as fertilizers.
? Observation of by-products. Previous tests.
? Physical effects of some by-products applied to the soil.
? Effects of some by-products on the germination and growth of plants.
? Evolution of different types of by-products.

4.4. Course planning and calendar

It is estimated that an average student must devote a total of 125 hours to this course, which should encompass both activities, according to the following calendar:

Tipo actividad / Semana	1	2 (1)	3 (2)	4 (3)	5	6	7	8	9	10	11	12	13	14	15	16	1
Actividad Presencial																	
Teoría	2	2	2	2	2	2			2		2	2	2				
Problemas											2	2		2	2		
Prácticas laboratorio	2	2	2	2	2				2								
Trabajos en grupo							2							2			
Salidas de prácticas								2					4				

Tutorías ECTS																
Evaluación															4	
Actividad No presencial																
Trabajo individual	4	4	5	4	4	5	4	4	4		4	4	4	4	5	
Trabajo en grupo							6								6	
TOTAL	8	8	9	8	8	7	12	6	8	0	8	8	10	8	17	0

4.5. Bibliography and recommended resources

BB Compostaje / Joaquín Moreno Casco, Raúl Moral Herrero (editores científicos). Madrid : Mundi Prensa, 2008

BB Fertilización nitrogenada : guía de actualización / [autores, Andreu, J. ... (et al.)] ; [coordinación, Fernando Orús Pueyo]. Zaragoza : Gobierno de Aragón, Departamento de Agricultura y Alimentación, 2006

BB Labrador Moreno, Juana. La materia orgánica en los agrosistemas : Aproximación al conocimiento de la dinámica, la gestión y la reutilización de la materia orgánica en los agrosistemas / Juana Labrador Moreno. 2ª ed. corr. y amp. Madrid : Ministerio de Agricultura, Pesca y Alimentación : Mundi-Prensa, D.L. 2002

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 Saña Vilaseca, Josep. La gestión de la fertilidad de los suelos : fundamentos para la interpretación de los análisis de suelos y la recomendación de abonado / Josep Saña Vilaseca, Joan Carles Moré Ramos, Alfred Cohí Ramón. Madrid : Ministerio de Agricultura, Pesca y Alimentación, Secretaría General Técnica, D.L. 1996

BB Tchobanoglous, George. Gestión integral de residuos solidos / George Tchobanoglous, Hilary Theisen, Samuel Vigil ; traducción y revisión técnica Juan Ignacio Tejero Monzón, José Luis Gil Diaz, Marcel Szanto Narea. [1a. ed. en español, reimpr.]. Madrid [etc.] : McGraw-Hill, D.L. 1996

BC Ávila Orive, José Luis. El suelo como elemento ambiental : perspectiva territorial y urbanística / José Luis Ávila Orive. Bilbao : Universidad de Deusto, 1998 [Comentario del profesor: libro electrónico]

BC Cabrera Capitán, Francisco, coord. De residuo a recurso. El camino hacia la sostenibilidad. III. Recursos orgánicos: Aspectos agronómicos y medioambientales. 4. Residuos orgánicos en la restauración/rehabilitación de suelos degradados orgánicos en la restauración/rehabilitación de suelos degradados. Madrid: Mundi-Prensa, 2014 [Comentario del profesor: libro electrónico]

BC Díaz, L.F., Ortiz, O., Bidlingmaier, W. (2007). Compost science and technology. Boston: Elsevier

BC Guerrero García, Andrés. El suelo, los abonos y la fertilización de los cultivos / Andrés Guerrero García. Madrid : Mundi-Prensa, 1990

BC Haug, Roger Tim. The practical handbook of compost engineering / Roger T. Haug. Boca Raton [etc.] : Lewis, cop. 1993

BC Laegreid, M. (Marit). Agriculture, Fertilizers and the Environment / M. Laegreid, O.C. Bockman and O. Kaarstad. Nueva York : Cabi Publishing, cop. 1999

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 Mora, J., et al. Bioindicadores en suelos y abonos orgánicos. Ibagué: Universidad de Tolima, 2019 [Comentario del profesor: libro electrónico]

BC Plaster, Edward J. La ciencia del suelo y su manejo / Edward J. Plaster. Madrid : Paraninfo, 2000

BC Raman, Saroja. Agricultural sustainability : principles, processes, and prospects / Saroja Raman. New York : Food Products Press, 2006

BC Seoánez Calvo, Mariano. Ingeniería del medio ambiente : aplicada al medio natural continental : la contaminación del medio natural continental: aire, aguas, suelos, vegetación y fauna. Tecnologías de identificación, lucha y corrección : manual técnico para el empresario, el ingeniero, el gestor medioambiental y el enseñante / Mariano Seoánez Calvo ; con la colaboración especial de Irene Angulo Aguado y del equipo de expertos coordinado por el Dr. Seoánez. 2ª ed. rev. Madrid [etc] : Mundi-Prensa, 1999

BC Thompson, Louis M. Los suelos y su fertilidad / Louis M. Thompson, Frederick R. Troeh ; [versión española por Juan Puigdefábregas Tomás]. 4a ed., [reimpr.]. Barcelona [etc.] : Reverté, D.L. 1988

BC Utilización de compost en los sistemas de cultivo hortícola / editores científicos, Peter J. Stoffella, Brian A. Kahn ; traducción, J. M. Mateo Box, Rosario García Moreno. Madrid [etc.] : Mundi-Prensa, 2005

BC Vázquez Piñeiro, Egeria. Actuaciones en infraestructuras para la gestión de residuos sólidos urbanos / [estudio elaborado por GEMATEC, S.A. por encargo de la Dirección General de Calidad y Evaluación Ambiental, equipo redactor, Egeria Vázquez Piñeiro, José María Josa García, Jorge Alcalá del Olmo]. Madrid : Centro de Publicaciones, Ministerio de Medio Ambiente, 1996

LISTADO DE URLs:

Alcañiz, J.M., Ortiz, O., Carabassa, V. (2008). Utilització de fangs de depuradora en restauració. Barcelona: Generalitat de [http://aca.gencat.cat/web/.content/10_ACA/J_Publicacions/03-guies/05-protocol_fangs_2006.pdf]

Díaz, L.F., Ortiz, O., Bidlingmaier, W. (2007).Compost science and technology. Amsterdam: Elsevier [http://ssu.ac.ir/cms/fileadmin/user_upload/Daneshkadaha/dbehdasht/markaz_tahghighat_olom_va_fanavarihaye_zist_moh

The updated recommended bibliography can be consulted in:http://psfunizar10.unizar.es/br13/egAsignaturas.php?codigo=25260