SUBJECT TEACHING GUIDE

M2132 - Modelling of Waste and Soil Treatment

Master's Degree in Environmental Engineering and Management

Academic year 2022-2023

1. IDENTIFYING DATA					
Degree	Master's Degree in Environmental Engineering and Management			Type and Year	Optional. Year 1
Faculty	School of civil Engineering				
Discipline	ENVIRONMENTAL MODELLING				
Course unit title and code	M2132 - Modelling of Waste and Soil Treatment				
Number of ECTS credits allocated	3	Term		Semester based (2)	
Web					
Language of instruction	Spanish	English Friendly	Yes	Mode of delivery	Face-to-face

Department	DPTO. CIENCIAS Y TECNICAS DEL AGUA Y DEL MEDIO AMBIENTE
Name of lecturer	AMAYA LOBO GARCIA DE CORTAZAR
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Office	E.T.S. de Ingenieros de Caminos, Canales y Puertos. Planta: + 2. DESPACHO - Area de Tecnologías del Medio Ambiente (2033)
Other lecturers	ANA LORENA ESTEBAN GARCIA CARLOS RICO DE LA HERA

3.1 LEARNING OUTCOMES
- - It is assumed that the student knows the basic subjects of waste and soil treatment technologies. The student must apply said knowledge plus those corresponding to basic engineering subjects such as leveling subjects and Bases of Environmental Engineering. The subject reviews the concepts of environmental modeling and the phenomena that occur in each waste and soil treatment system, but the subject is fundamentally based on the creative and practical work of the student, who is gradually faced with the construction of models to solve different real cases taken from the professional field . The student faces individually (with the direct support and tutoring of the teaching staff) the construction of design models, stationary simulation and dynamic simulation, considering in general the three phases that occur in this type of systems: solid, liquid and gas. The student will deliver their work with pre-established deadlines for the corresponding quality control
- - Capacity for theoretical analysis of a waste or soil treatment process, with a view to its modeling
- - Ability to build a theoretical model of a waste or soil treatment process
- - Ability to calibrate and validate a theoretical model applied to a specific case
- - Ability to apply a theoretical model to specific cases.
- - Ability to interpret the simulation results with specific case models, defining the limitations and possible errors

4. OBJECTIVES
The student must be able to: - Identify, understand and use the concepts and terms of environmental modeling, and specifically applied to waste and soil treatment systems. - Prepare and build design and simulation models of waste and soil treatment systems according to cases and objectives.
- Apply and use different existing simulation models to specific cases.
- Calibrate and validate models based on specific data.

6. COURSE ORGANIZATION	
CONTENTS	
1	1.- Modeling principles.
2	2.- Models of waste treatment processes. 2.1.- Triage. Waste stream separation
3	2.2.- Composting.
4	2.3.- Biomethanization.
5	3.- Models of management and treatment of contaminated soils.
6	4.- Landfill modeling
7	Exhibition and defense of the Practical Cases

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Practical Cases	Work	Yes	Yes	50,00
Practical tasks with computer	Others	No	No	40,00
Class participation	Others	No	No	10,00
TOTAL				100,00

Observations

In each area studied, the professors will present different practical cases that the students will have to solve with the application of the constructed or studied models, having to present a written report and make an oral presentation and defense in the final evaluation.
In the work sessions, different Tasks to be developed in the computer practices will be proposed , which the students should solve and upload to the platform within the indicated deadlines, normally one week.
The activity of the students during the classes will be evaluated by each teacher and weighted globally.

Observations for part-time students

The part-time student will have the same evaluation system, freeing them from participation in class.

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

- Jonathan B. Snape, Irving J. Dunn, John Ingham, Jiří E. Přenosil, (1995) Dynamics of Environmental Bioprocesses: Modelling and Simulation. Wiley VCH.

- Bajpai, Pratima. 1997, Biotreatment, downstream processing and modelling: Springer,

- Eweis, J.B.; Ergas,S.J.; Chang, D.P.; Shroeder, E.D. (1999). “Principios de Biorrecuperación: Tratamientos para la descontaminación y regeneración de suelos y aguas subterráneas mediante procesos biológicos y físico-químicos”, (Traducido por: Iñaki Tejero, Juan José Amieva.) McGraw-Hill/Interamericana de España, S.A.

George Tchobanoglous, Hilary Theisen, Samuel A. Vigil. (1994). “Gestión integral de residuos sólidos”. (Traductores: Tejero Monzón, J.I.; Gil Díaz, J.L.; Szanto Narea, M.). McGraw-Hill / Interamericana de España, S.A.

- Morris Levin, Michael A. Gealt. (1997). “Biotratamiento de residuos tóxicos y peligrosos: Selección, estimación, modificación de microorgsanismos y aplicaciones”. (Traductores: Iñaki Tejero, Juan José Amieva.) McGraw-Hill/Interamericana de España, S.A.

-- Manuales de los modelos.