SUBJECT TEACHING GUIDE

577 - Transport and Mixing Processes

Master's degree in integrated management of water systems

Academic year 2023-2024

1. IDENTIFYING DATA					
Degree	Master's degree in integrated management of water systems			Type and Year	Compulsory. Year 1
Faculty	School of civil Engineering				
Discipline					
Course unit title and code	577 - Transport and Mixing Processes				
Number of ECTS credits allocated	2	Term		Semester based (1)	
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	ANDRES GARCIA GOMEZ
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Other lecturers	

3.1 LEARNING OUTCOMES
- To know the advection-diffusion equation.
- To know the different scales of diffusion (molecular, turbulent diffusion, dispersion) and the methods and expressions for their estimation.
- To know the main reaction kinetics and its implementation in the advection-diffusion equation.
- To know the exchange processes at air-water and sediment-water interfaces and its inclusion in the advection- diffusion equation.
- To evaluate the effect of discharges on aquatic ecosystems.
- To know and understand the behavior of jets and plumes.
- To apply the advection-diffusion equation in specific situations.

4. OBJECTIVES
The student will acquire several high relevant concepts related with the study of the evolution of pollutants in the aquatic environment and will be able to implement them.

6. COURSE ORGANIZATION	
CONTENTS	
1	Introduction to mixing and transport processes.
2	Basic concepts of hydrodynamics and turbulence.
3	Advection and diffusion: advection-diffusion equation, turbulent diffusion, dispersion, mixing in estuaries
4	Decay processes: non-conservative substances.
5	Exchange processes at air-water and sediment-water interfaces.
6	Jets and plumes.

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Use of the advection-diffusion equation including reaction terms	Others	No	Yes	20,00
Assessment of the pollution in a water body	Others	No	Yes	20,00
3 partial tests	Written exam	No	Yes	20,00
Final exam	Written exam	Yes	Yes	40,00
TOTAL				100,00

Observations

As accorded by the relevant committees, as a general rule, and unless stated otherwise anywhere in this guide:
- A student cannot request a reexamination if the original grade obtained in the evaluation was not a fail .
- The reexamination activity will take the same form than the original evaluation activity.
- Grades are measured on a numeric scale going from 0 to 10, where values smaller than 5 are a Fail.

Marks obtained in the course evaluation activities will be kept until the re-sit examination period.

Only for duly justified reasons (eg sanitary restrictions) the evaluation tests may be organized remotely, with prior authorization from the Center's Administration.

Observations for part-time students

Part-time students will need to assist to the final exam of the subject and complete the practical activities.

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

Chin, D.A. (2006). Water-Quality Engineering in Natural Systems. Wiley-Interscience, John Wiley and Sons, New Jersey.

Fischer, H. B., List, E. J., Koh, R. C., Imberger, J., Brooks, N. H. (1979). Mixing in Inland and Coastal Waters. Academic Press, Inc. San Diego, California.

Graf, W.H., Altinakar, M.S. (1998). Fluvial Hydraulics. Flow and Transport Processess in Channels of Simple Geometry. John Wiley and Sons, Chichester, Inglaterra.

Kiely, G. (1999). Ingeniería Ambiental. Fundamentos, entornos, tecnologías y sistemas de gestión. McGraw-Hill.

Martin, J.L.; McCutcheon, S.C. (1999). Hydrodynamics and Transport for Water Quality Modeling. Lewis Publishers.