SUBJECT TEACHING GUIDE

M1892 - Fundamentals of environmental modeling

Master's degree in integrated management of water systems

Academic year 2022-2023

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	M1892 - Fundamentals of environmental modeling				
Number of ECTS credits allocated	2	Term		Semester based (1)	
Web					
Language of instruction	Spanish	English Friendly	No	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 identify the elements that make up a numerical model understanding their role.
- To know the options and techniques available to conduct an environmental flows study using a numerical model.
- To perform simple numerical integration of one-dimensional problems using discretization techniques.
- To criticize the results provided by a numerical model.

4. OBJECTIVES

The main objective is to provide the student an overview of the techniques applied in the simulation of environmental flows problems.

6. COURSE ORGANIZATION

CONTENTS	
1	Introduction to numerical models.
2	Discretization techniques: finite difference and finite volume methods.
3	Introduction to methods for solving equations: methods to solve a system of linear equations, methods to solve ordinary differential equations, methods to solve non-stationary problems.
4	Computational modelling of environmental flows: numerical models, hydrodynamic modelling, water quality modelling.

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Introduction to the discretization of a mathematical model	Others	No	Yes	10,00
Finite differences discretization of equations	Others	No	Yes	10,00
Finite volume discretization of equations	Others	No	Yes	10,00
Development of a one-dimensional numerical model for solving an environmental flows problem	Others	No	Yes	30,00
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 practical activities similar to those worked during the course.

8. BIBLIOGRAPHY AND TEACHING MATERIALS
BASIC
Lomax, H., Pulliam, T. H., Zingg, D. W. (2006). Fundamentals of Computational Fluid Dynamics (Scientific Computation). Springer.
Novak, P., Guinot, V., Jeffrey, A., Reeve, D.E. (2010). Hydraulic Modelling - an Introduction. Spon Press. London and New York.
Schafer, M. (2006). Computational Engineering - Introduction to Numerical Methods. Springer. Germany.
Szymkiewicz, R. (2010). Numerical Modeling in Open Channel Hydraulics. Springer.