

## SUBJECT TEACHING GUIDE

### 688 - Models of Water Treatment System

#### Master's Degree in Environmental Engineering and Management

Academic year 2023-2024

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	688 - Models of Water Treatment System				
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	RUBEN DIEZ MONTERO				
E-mail	ruben.diezmontero@unican.es				
Office	E.T.S. de Ingenieros de Caminos, Canales y Puertos. Planta: + 2. CIRCULACION 2029 (2029)				
Other lecturers	AMAYA LOBO GARCIA DE CORTAZAR				

3.1 LEARNING OUTCOMES
- Developing a theoretical analysis of a system for water treatment, adapted to its scope (design or simulation).
- Building design models for water treatment processes, based on a spreadsheet.
- Building steady-state simulation models for water treatment systems, based on a spreadsheet.
- Building dynamic simulation models for water treatment systems, based on a spreadsheet.
- Describing the most common simulation models for water treatment and applying them to real cases.
- Modelling real water treatment systems based on widespread simulation software.
- Calibrating simulation models of water treatment systems with real data.
- Using models for scenario analysis, diagnosis and proposal of improvements for water treatment systems.

#### 4. OBJECTIVES

Identifying, understanding and using the principle words and concepts regarding modelling of water treatment systems.

Applying simulation models for the design, diagnosis, monitoring and improvement of water treatment systems.

Developing design models for water treatment systems based on a spreadsheet.

Developing simulation models for water treatment processes.

#### 6. COURSE ORGANIZATION

##### CONTENTS

1	An introduction to models. Theoretical analysis of systems.
2	Calculation and design models
3	Steady-state and dynamic simulation models. Spatial discretization.
4	International Water Association (IWA) models for biological processes for water treatment. ASIM software for simulation of water treatment systems.
5	Widespread software for simulation of water treatment systems: GPS-X, BIOWIN, AQUASIM.

#### 7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Questionnaires	Written exam	No	Yes	30,00
Practical cases	Work	No	Yes	40,00
Computer practices	Others	No	Yes	15,00
Course work	Work	No	Yes	15,00
TOTAL				100,00
Observations				
Observations for part-time students				
The evaluation for part-time student includes all the same activities set for the rest of students, with identical weightings.				

#### 8. BIBLIOGRAPHY AND TEACHING MATERIALS

##### BASIC

Tejero, I.; Suarez, J.; Jácome, A.; Temprano, J. (2001) Introducción a la Ingeniería Sanitaria y Ambiental. Vol. 1 y 2. ISBN:84-607-3989-9. E.T.S.I.C.C.P., Universidad Coruña, Universidad Cantabria.

M. Henze; W. Gujer; T. Mino; M. van Loosdrecht (2006) Activated Sludge Models ASM1, ASM2, ASM2d and ASM3. ISWA Task Group on Mathematical Modelling for Design and Operation of Biological Wastewater Treatment .

EnviroSim Associates Ltd. (2010) BioWin Help Manual.

P. Reichert (1998) Aquasim 2.0. User Manual. Computer Program for the Identification and Simulation of Aquatic Systems . Swiss Federal Institute for Environmental Science and Technology (EAWAG).

