

## SUBJECT TEACHING GUIDE

M2123 - Design of Water Treatment Systems

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 TECHNOLOGIES				
Course unit title and code	M2123 - Design of Water Treatment Systems				
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	ANA LORENA ESTEBAN GARCIA				
E-mail	analorena.esteban@unican.es				
Office	E.T.S. de Ingenieros de Caminos, Canales y Puertos. Planta: + 2. DESPACHO PROFESOR (2031)				
Other lecturers					

3.1 LEARNING OUTCOMES
-- Capacity for theoretical analysis of any WWTP project tender document
-- Ability to design, size and project a water treatment
-- Ability to select water treatment alternatives based on different scenarios.
-- Ability to configure flow diagrams of the different flows of a water treatment
-- Ability to implement a complete water treatment system, both in plan and elevation from the ground
-- Ability to define all the pipeline systems and connections between the elements of a water treatment system

#### 4. OBJECTIVES

Give students the ability to, based on a Tender Document for a real Water Treatment System, prepare the project offer meeting all the conditions.

Guide students in the tasks of:

- Design and size the treatment train that meets the stated objectives, as well as all auxiliary works.
- Define the diagrams of all the flows of the system (water, sludge, gas, air, electrical network, road,...).
- Define the implementation of all the elements of the treatment system, defining their dimensions with respect to the ground.

#### 6. COURSE ORGANIZATION

##### CONTENTS

1	Regulations for developing projects. Legal aspects. Contract documentation. Cost analysis. Bidding Documents. Statement of specific technical requirements. Administrative clauses.
2	Flowcharts. How to structure them. Examples.
3	Raw water pumping and Pretreatment. Entrance wells. Pumping wells. Coarse screening. Fine screening. Grit removal. Degrease. Process design and conditions to take into account for its implementation.
4	Primary treatment. Distribution works. Sedimentation. Physical-chemical treatment. Process design and conditions to take into account for its implementation.
5	Secondary treatment. Removal of carbonaceous organic matter. Nitrification. Process design and conditions to take into account for its implementation.
6	Secondary treatment. Systems and forms of aeration. Distribution works. Secondary settling. Sludge recirculation pumping. Liquor pumping. Pumping excess sludge. Process design and conditions to take into account for its implementation.
7	Sludge treatment I. Sludge screening. Gravity thickening. Mechanical thickening. Sludge flotation. Process design and conditions to take into account for its implementation.
8	Sludge treatment II. Sludge digestion. Dewatering. Process design and conditions to take into account for its implementation.
9	Tertiary treatment. Conventional treatments, decantation, filtration. Advanced treatments, micro filtration, ultrafiltration. Disinfection. Process design and conditions to take into account for its implementation.
10	Presentation and defense of the project.

#### 7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
The student will deliver the written document of the project and will make an oral presentation in the classroom, answering the questions that are asked.	Oral Exam	Yes	Yes	100,00
TOTAL				100,00
Observations				
Observations for part-time students				
The part-time student will have the same evaluation system				

## 8. BIBLIOGRAPHY AND TEACHING MATERIALS

### BASIC

Pliego real de un concurso de sistema de tratamiento de aguas

Normas correspondientes a proyectos de sistemas de tratamiento de aguas

Apuntes de la asignatura