

## SUBJECT TEACHING GUIDE

M2097 - Water Treatment and Purification

Master's Degree in civil Engineering, Canal and Port Engineering

Academic year 2022-2023

1. IDENTIFYING DATA					
Degree	Master's Degree in civil Engineering, Canal and Port Engineering			Type and Year	Compulsory. Year 1
Faculty	School of civil Engineering				
Discipline	WATER TREATMENT AND PURIFICATION				
Course unit title and code	M2097 - Water Treatment and Purification				
Number of ECTS credits allocated	4,5	Term	Semester based (2)		
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	JAVIER TEMPRANO GONZALEZ
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Other lecturers	

### 3.1 LEARNING OUTCOMES

- Identify and describe the main characterization parameters of natural water quality.
- Describe and evaluate the main effects of a wastewater discharge into rivers , taking into account its capacity for self-purification.
- Describe and evaluate the main effects of a wastewater discharge in lakes and reservoirs , taking into account its capacity for self-purification.
- Describe the main phenomena triggered by a discharge of wastewater into the sea, taking into account its capacity for self-purification.
- Describe the operation of the main water treatment units for consumption, including desalination units.
- Design and dimension the elements for the treatment of drinking water, including desalination.
- Describe the operation of the main wastewater treatment units.
- Design and dimension the elements of urban wastewater treatment.

### 4. OBJECTIVES

The student must be able to:

- Understand the operation of an ETAP and design any element of it.
- Design and diagnose basic conventional systems for wastewater treatment and management of the sludge produced.
- Understand the reuse of water and design the necessary systems to meet the quality criteria for a specific use.

### 6. COURSE ORGANIZATION

CONTENTS	
1	Drinking water treatment. Free settling Coagulation. Flocculation Special settlers Filtration. Quick filtration. Disinfection. Chlorination Ozonation. UV.
2	Receiving media. Self-purification in rivers. Dumping into lakes and reservoirs. Dumped into the sea.
3	Sewage Treatment. Introduction Pretreatments. Primary Treatments. Biological Treatments. Fundamentals. Bacterial beds. Active sludge. Sludge treatment and evacuation. Thickening. Sludge Stabilization Dehydration and Evacuation of Sludge.  The reuse of wastewater.
4	Laboratory. Two practices: Coagulation-flocculation and efficiency of disinfection.

## 7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
The exam will consist of two parts. The first part will correspond to the contents of the block 1 and the second partial to those of blocks 2 and 3. The exam of the first part (first partial) will be done after having completed the contents of block 1 in	Written exam	No	Yes	50,00
The laboratory activities will be evaluated through the practice notebooks delivered by the students. students. Being an eminently practical activity, attendance is mandatory.	Laboratory evaluation	No	No	30,00
Practical jobs	Work	No	No	20,00
<b>TOTAL</b>				<b>100,00</b>
<b>Observations</b>				
<p>In relation to the resolutions adopted in the ordinary session of the School Board held on June 10, 2010, it is established that, with respect to the evaluation activities that are recoverable,</p> <ul style="list-style-type: none"> <li>• As a general criterion and unless something different is specified in this guide , a student may only appear for recovery of those activities that he has not passed, that is, in which he has not obtained a minimum grade of five out of ten.</li> <li>• As a general criterion and unless something different is specified in this guide , in the recovery period the evaluation procedure of an activity will be the same as that of the activity that originates it.</li> </ul> <p>Note: According to Royal Decree RD 1125/2003 on the European credit system and the system of qualifications in official university degrees and valid throughout the national territory, the results obtained by the student in each of the subjects of the plan Studies will be graded according to the following numerical scale from 0 to 10, with an expression of one decimal place, to which their corresponding qualitative score may be added: 0.0-4.9: Suspense (SS). 5.0-6.9: Pass (AP). 7.0-8.9: Notable (NT). 9.0-10: Excellent (SB).</p> <p>Only for duly justified reasons (eg sanitary restrictions) the evaluation tests may be organized remotely, with prior authorization from the Center's Management.</p> <p>If the health situation prevents the carrying out, in whole or in part, of the laboratory practices or the visit, the activity would be replaced by individual work.</p> <p>Each midterm exam will consist of theory and problems. To determine the grade, a weighting will be carried out, the weight of the problems being generally double with respect to the theory. The minimum unit of evaluation is the block (theory plus problems), not allowing the presentation only to theory or only to problems.</p> <p>In case of not passing the course in June, the approved partial exams will be kept for the extraordinary exam and the student must take the failed blocks.</p> <p>The results obtained in the extraordinary exam are final, not saving the marks obtained from each block for the following year. Labs are also not saved for subsequent courses.</p>				
<b>Observations for part-time students</b>				
<p>The part-time student has to attend the laboratory, pass it and will be evaluated by a final exam (in the event that they have not done the practices and presented the report throughout the course like the rest of the students). It is the responsibility of the part-time student to be attentive to the dates of completion of the practices and the dates of delivery of the practical works.</p>				

## 8. BIBLIOGRAPHY AND TEACHING MATERIALS

### BASIC

- TEJERO, I.; SUAREZ, J.; JÁCOME, A.; TEMPRANO, J. (2004). "Introducción a la Ingeniería Sanitaria y Ambiental". Vol. 1 y 2. ISBN:84-89627-68-1. ETS de Ingenieros de Caminos, Canales y Puertos, Universidad Cantabria.
- TEJERO; SUAREZ; TEMPRANO; JÁCOME; GARCÍA. (2000). Problemas de Ingeniería Sanitaria y Ambiental. ISBN: 84-607-0983-3. ETS de Ingenieros de Caminos, Canales y Puertos, Universidad Cantabria y Universidad de La Coruña.