

## SUBJECT TEACHING GUIDE

### 1143 - Water Treatment and Waste Management

Master's Degree in mining engineering

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Academic year 2023-2024

1. IDENTIFYING DATA					
Degree	Master's Degree in mining engineering Master's Degree in mining engineering			Type and Year	Compulsory. Year 1 Compulsory. Year 1
Faculty	School of Mines and Energy Engineering				
Discipline	THE ENVIRONMENT				
Course unit title and code	1143 - Water Treatment and Waste Management				
Number of ECTS credits allocated	4,5	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	AMAYA LOBO GARCIA DE CORTAZAR CARLOS RICO DE LA HERA				

### 3.1 LEARNING OUTCOMES

- To be competent in water treatment techniques and waste management.

- Master all aspects related to environmental management.

**4. OBJECTIVES**

Provide students with general knowledge about environmental protection and regulations in the areas of environmental quality, water, waste and soils.
Provide students with knowledge that allows them to evaluate quality and contamination parameters of a water, waste or soil.
Provide students with knowledge that allows them to quantify the amount of water, wastewater and solid waste to treat or manage.
Present to students the main techniques for the management and treatment of water, waste and soils.
Provide students with knowledge and tools to size water treatment and purification facilities, and waste management.

**6. COURSE ORGANIZATION**

CONTENTS	
1	SECTION 1.- INTRODUCTION TO WATER, WASTE AND POLLUTED SOILS MANAGEMENT The environmental protection. Comprehensive analysis of pollution problems. The sources of pollution. Uses of the Environment. Objectives of environmental protection. Legal and Normative Philosophy. Indicators and parameters of quality and contamination. Quantification of pollution: Water demands, Loads and specific productions. Legislation and Regulations: Environmental Quality, Water, Waste, Soils.
2	SECTION 2.-DESIGN OF TREATMENT TECHNOLOGIES. Physical Treatments: Pretreatments, Decantation, Filtration, Separation of solids. Chemical Treatments: Coagulation-Flocculation, Precipitation, Ion Exchange, Adsorption, Oxidation, Inertization, Disinfection. Biological Treatments: Bases, Biokinetics, Active Sluge, Composting / Biopiles, Anaerobic Digestion.
3	SECTION 3.- APLICATIONS TO PROJECTS Treatment of Supply Water. Drinking water. Boiler water. Wastewater Treatment and Reuse: Urban, Industrial. Management, Treatment and Recovery of Waste: Urban, Industrial. Management and Treatment of Hazardous Waste. Management and Treatment of Contaminated Soils. Controlled landfills: non-hazardous, hazardous, inert.

7. ASSESSMENT METHODS AND CRITERIA				
Description	Type	Final Eval.	Reassessn	%
Laboratory	Laboratory evaluation	No	No	5,00
Visits	Others	No	No	5,00
Partial Exam 1	Written exam	No	Yes	14,00
Partial Exam 2	Written exam	No	Yes	14,00
Partial Exam 3	Written exam	No	Yes	14,00
Partial Exam 4	Written exam	No	Yes	18,00
Tasks	Work	No	Yes	30,00
<b>TOTAL</b>				<b>100,00</b>
<b>Observations</b>				
<p>Students must obtain a minimum value of 5.0 in the average mark of the partial exams and at least 5.0 in the weighted average of all the evaluation tests in order to pass the course. If this minimum value is not reached, the overall grade will be the lowest value between 4.9 and the weighted average of all the evaluation tests.</p> <p>Extraordinary call:</p> <ul style="list-style-type: none"> <li>- All the evaluation activities are recoverable except practices and visits.</li> <li>- Partial exams marks are kept until the extraordinary call.</li> <li>- Students are allowed to attend the recovery of a partial exam to raise the grade (the highest of the the two marks will be considered). Students may be asked to communicate the exams they are going to take to raise the grade.</li> </ul>				
<b>Observations for part-time students</b>				
<p>Part-time students must attend the following classroom activities: written examination, report presentation, laboratory practices and visits.</p> <p>The presentation of works, if requested and properly justified, may be done by videoconference.</p> <p>Lab practice, if requested and properly justified, can be replaced by a report.</p> <p>Like the other students, they will have teaching material available on the virtual platform Moodle.</p>				

8. BIBLIOGRAPHY AND TEACHING MATERIALS
<b>BASIC</b>
<p>TEJERO, I.; SUÁREZ, J.; JÁCOME, A.; TEMPRANO, J. (2004). "Ingeniería Sanitaria y Ambiental". Vol. 1 y 2. ISBN:84-89627-68-1. E.T.S.I.C.C.P., Universidad Cantabria.  <a href="http://catalogo.unican.es/cgi-bin/abnetopac/?TITN=222765">http://catalogo.unican.es/cgi-bin/abnetopac/?TITN=222765</a></p>
<p>TEJERO, I.; SUÁREZ, J.; TEMPRANO, J.; JÁCOME, A.; GARCÍA, C. (2000). "Problemas de Ingeniería Sanitaria y Ambiental". ISBN: 84-607-0983-3. E.T.S.I.C.C.P. Universidad Cantabria. Universidad Coruña.  <a href="http://catalogo.unican.es/cgi-bin/abnetopac/?TITN=173907">http://catalogo.unican.es/cgi-bin/abnetopac/?TITN=173907</a></p>
APUNTES DE LA ASIGNATURA