

29938 - Technologies for Treatment of Polluted Waters and Gases

Información del Plan Docente

Academic Year	2016/17
Academic center	110 - Escuela de Ingeniería y Arquitectura
Degree	435 - Bachelor's Degree in Chemical Engineering
ECTS	6.0
Course	4
Period	Second semester
Subject Type	Optional
Module	---

1.Basic info

1.1.Recommendations to take this course

1.2.Activities and key dates for the course

2.Initiation

2.1.Learning outcomes that define the subject

2.2.Introduction

3.Context and competences

3.1.Goals

3.2.Context and meaning of the subject in the degree

3.3.Competences

3.4.Importance of learning outcomes

4.Evaluation

5.Activities and resources

5.1.General methodological presentation

The course includes both theory and practice. The methodological approach design for this course is based on the immersion of the student in the topic of environmental pollution, so he/she can gain the knowledge and skills necessary in order to face projects and, in general, any work activities, including environmental considerations in both management and technical tasks.

The class and laboratory materials available for the students can be found at the subject website (Moodle platform):
<http://moodle2.unizar.es/add/>

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The programmed activities are detailed below.

5.2. Learning activities

1. Theory lectures (TP1): 30 hours (on-site activity)
2. Exercises and case studies sessions (TP2): 15 hours (on-site activity). Exercises and case studies will be done in order to complement theoretical sessions.
3. Laboratory sessions (TP3): 10 hours (on-site activity).
4. Visits to facilities related to water and air treatment and quality control (TP4): 5 hours (on-site activity).
5. Tutored case studies (TP6): 30 hours (non on-site activity). Guidance, monitoring and evaluation of guided work.
6. Evaluation (TP8): 6 hours (on-site activity).
7. Study (TP7): 54 hours (non on-site activity).
8. Tutorials.

5.3. Program

Theory and practical cases sessions.

Module 1: WATER TREATMENT TECHNOLOGIES (B1)

1.1. Water Quality and Pollution

Legislation. Resources: availability, composition, use and pollution.

1.2. Water Supply Treatments

Softening, demineralisation, ultrapurification and disinfection processes; drinking water treatment and desalination.

1.3. Wastewater Treatments

Urban and industrial wastewater: characteristics and environmental effects. Flow and load regulation. Wastewater treatment and reclamation [\[U1\]](#) processes for effluent reusing.

Bloque 2: AIR POLLUTION CONTROL (B2)

2.1. Atmosphere and air quality.

The atmosphere. Air quality. Deepening on aspects relevant to the main air pollutants. Global warming.

2.2. Air Pollutant Control.

NO_x control strategies, SO₂ minimization, CO₂ capture and storage, pollutant minimization in mobile sources.

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Laboratory sessions:

CPL1. DRINKING WATER PRODUCTION FROM NATURAL HYDROLOGICAL RESOURCES

CPL2. OPERATIONAL CONTROL OF ACTIVATED SLUDGE PLANT

CPL3. ZARAGOZA HEAT ISLAND

CPL4. ATMOSPHERIC POLLUTION EVALUATION IN EINA SURROUNDINGS

5.4.Planning and scheduling

WEEK	Theory and Exercises			Laboratory	Visits	TP6	Exam
	TP1 and TP2			TP3	TP4	delivery	TP8
1	Course Presentation	B1	B1				
2	B1	B1	B1				
3	B1	B1	B1			TGB1_1	
4	B1	B1	B1	CPL1		TGB1_2	
5	B1	B1	B1		VISIT	TGB1_3	
6	B1	B1	B1	CPL2		TGB1_4	
7	B1	B1	B1				
8	B1	B2	B2				B1 Exam
9	B2	B2	B2	CPL3			
10	B2	B2	B2		VISIT		

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11	B2	B2	B2	CPL4		TGB2_1	
12	B2	B2	B2			TGB2_2	
13	B2	B2	B2			TGB2_3	
14	B2	B2	B2			TGB2_4	
15	B2	B2	B2				B2 Exam

5.5. Bibliography and recommended resources

BB	Ingeniería de aguas residuales : tratamiento, vertido y reutilización / Metcalf and Eddy ; revisado por George Tchobanoglous, Franklin L. Burton ; traducción y revisión técnica, Juan de Dios Trillo Montsoriu, Ian Trillo Fox ; prólogo de Angel Cajigas . - 3a. ed., [reimpr.] Madrid [etc.] : McGraw-Hill, D.L. 2000
BB	Wark, Kenneth. Contaminación del aire : origen y control / Kenneth Wark , Cecil F. Warner . - [Reimp.] México D. F. : Limusa, cop. 2006
BC	Arceivala, Soli J.. Wastewater treatment for pollution control and reuse / Soli J. Arceivala, Shyam R. Asolekar . - 3rd ed., 2nd repr. New Delhi : Tata McGraw-Hill, 2008
BC	Calidad y tratamiento del agua : manual de suministros de agua comunitaria / American Water Works Association Madrid [etc.] : McGraw Hill, D.L. 2002
BC	Design of municipal wastewater treatment plants. Volume I, Planing and configuration of Wastewater treatment plants . - 4th ed. Alexandria, VA (U.S.A.) : Water environment federation ; Reston : American society of civil engineers, cop. 1998
BC	Kohl, A. Gas Purification / Kohl A., Nielsen R . Fifth Edition. Gulf Professional Publishing, 1997.
BC	Seinfeld, John H. : Atmospheric chemistry and physics : from air pollution to climate change / John H. Seinfeld, Spyros N. Pandis . - 2nd ed. Hoboken : John Wiley and sons, cop. 2006

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