66224 - Water Quality and Treatment

Información del Plan Docente

Academic Year	2016/17
Academic center	110 - Escuela de Ingeniería y Arquitectura
Degree	531 - Master's in Chemical Engineering
ECTS	6.0
Course	1
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 water pollution control, 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): 35 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. Two Laboratory sessions (TP3): 7 hours (on-site activity).
4. One Field practice: 3h (on-site activity).
5. Tutored case studies (TP6): 14 hours. Guidance, monitoring and evaluation of guided works.
6. Evaluation (TP8): 10 hours (on-site activity).
7. Study (TP7): 52 hours (non on-site activity).
8. Tutorials: 14 hours (on-site activity)

5.3.Program

Theoretical and Exercises sessions

Module 1. LEGISLATION RELATED TO WATER POLLUTION CONTROL (B1)

1.1. Water legislation

1.2. River basin organizations and competent authority in water management. Water catchment regulation and waste discharge authorization.

2. NATURAL WATER STATUS (B2)

2.1. Groundwater. Natural composition. Quality criteria and chemical status. Control Networks.

2.2. Surface water. Natural composition of rivers, lakes, transitional, and coastal waters. Quality criteria, chemical, and ecological status. Control Networks.

2.3. Protected Areas. Quality required of waters used for the abstraction of drinking water, bathing waters, freshwaters needing protection or improvement in order to support fish life. Nutrient-sensitive areas. Control Networks.

2.4. Pressures and impact assessment: Pollution Risk Quantification.

3. USE OF WATER: QUALITY AND TREATMENT (B3)

3.1. Water for human consumption. Quality criteria and treatment facilities. Design and Operation of Drinking Water Treatment Plants. Waste management.

3.2. Water used in industrial activities. Quality criteria and treatment facilities.

3.3. Water used in agricultural, forestry and aquaculture. Quality criteria and treatment technologies.

3.4. Water used in recreational activities. Quality criteria and treatment technologies.

3.5. Water used for ambiental purposes. Quality criteria and treatment technologies.

4. WASTEWATER CONTROL AND TREATMENT (B4)

4.1. Effluent Guidelines for direct and indirect wastewaters. Pollution Fees and Taxes. Sustainable Drainage Systems.

4.2. Urban and biodegradable industrial wastewaters. Control Networks. Wastewater Treatment Plants (WWTP) type 1, type 2, type 3. Reclamation of treated effluents. Waste management in WWTP. Design and Operation of WWTPs for small, medium and large agglomeratios. Control of waste water discharging into receiving waters which are considered sensitive areas: nutrient removal processes.

4.3. Industrial wastewater containing hazardous substances. Control Networks. Treatment technologies in specific studied cases.

LABORATORY SESSIONS

"INDUSTRIAL WASTEWATER TREATMENT CONTAINIG NON-BIODEGRADABILITY SUBSTANCES"

Session 1: Treatment at laboratory scale (PL1)

Session 2: Treatment Simulation by Superpro Designer V9.0 (PL2)

FIELD PRACTICE (PC)

"ASSESSMENT OF ECOLOGICAL STATUS OF EBRO RIVER WATER IN ZARAGOZA"

5.4.Planning and scheduling

WEEK	THEORY, EXERCISES AND TTs DELIVERY (TP1, TP2 and TP6)				Laboratory and Field sessions (TP3 y TP4)
	h1	h2	h3	h4	
1	Course Presentation	B1	B1	B1	

2	**B1**	**B1**	**B1**	**TT1**	
3	**B1**	**B2**	**B2**	**TT2**	
4	**B2**	**B2**	**B2**	**TT3**	
5	**B2**	**B2**	**B2**	**TT4**	
6	**B2**	**B2**	**B2**	**B2**	
7	**B3**	**B3**	**B3**	**TT5**	
8	**B3**	**B3**	**B3**	**TT6**	**PC**
9	**B3**	**B3**	**B3**	**B3**	
10	**B3**	**B3**	**B3**	**B3**	
11	**B3**	**B4**	**B4**	**TT7**	
12	**B4**	**B4**	**B4**	**B4**	**PL1**
13	**B4**	**B4**	**B4**		**PL2**
14	**B4**	**B4**	**B4**		
15	**B4**	**B4**	**B4**	**TT8**	
Next	**EXAM (TP8)**				

5.5.Bibliography and recomended resources

BB	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
BB	Design of municipal wastewater treatment

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	plants. Volume II, Liquid treatment processes . - 4th ed. Alexandria, VA (U.S.A.) : Water environment federation ; Reston : American society of civil engineers, cop. 1998
BB	Design of municipal wastewater treatment plants. Volume III, Solids Processing and Disposal . - 4th ed. Alexandria, VA (U.S.A.) : Water environment federation ; Reston : American society of civil engineers, cop. 1998
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	Isla de Juana, Ricardo. Proyectos de plantas de tratamiento de aguas : aguas de proceso, residuales y de refrigeración / Ricardo Isla de Juana . - 1ª ed. Madrid : Bellisco, 2005
BC	Calidad y tratamiento del agua : manual de suministros de agua comunitaria / American Water Works Association Madrid [etc.] : McGraw Hill, D.L. 2002
BC	Crites, Ron. Sistemas de manejo de aguas residuales : para núcleos pequeños y descentralizados / Ron Crites, George Tchobanoglous ; traducción, Miller Camargo, Libia Patricia Pardo ; traducción y rev. técnica, Guillermo Mejía Santafé de Bogotá [etc.] : McGrawHill, cop. 2000
BC	Gestión y tratamiento de aguas residuales / [editan, Mª Peña Ormad Melero, Begoña Calvo Calzada] [Zaragoza : s. n.], D.L. 2011
BC	Medina San Juan, José Antonio. Desalación de aguas salobres y de mar : Osmosis inversa / Jose Antonio Medina San Juan Madrid [etc.] : Mundi-Prensa, 2000
BC	Operation of Municipal Wastewater Treatment Plants. Volume I, Management and Support Systems . - 5th ed. Alexandria, VA (U.S.A.) : Water environment federation, 1996
BC	Operation of Municipal Wastewater Treatment Plants. Volume II, Liquid processes . - 5th ed. Alexandria, VA (U.S.A.) : Water environment federation, 1996
BC	Operation of Municipal Wastewater Treatment Plants. Volume III, Solid processes . - 5th ed. Alexandria, VA

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	(U.S.A.) : Water environment federation, 1996
BC	Ramalho, R.S.. Tratamiento de aguas residuales / R.S.Ramalho ; [versión española por Domingo Jiménez Beltrán, Federico de Lora, Rubens Sette Ramalho] Barcelona [etc.] : Reverté, D.L.1993
BC	Standard methods for the examination of water and wastewater . - 21st ed Washington : American Public Health Association : American Water Works Association : Water Environment Federation, 2005
BC	Tratamiento del agua por procesos de membrana : Principios, procesos y aplicaciones / American Water Works Association, Lyonnaise des Eaux, Water Research Commision of South Africa Madrid : McGraw Hill, D.L. 1998
BC	Water treatment plant design / American Society of Civil Engineers, American Water Works Association . - 2nd ed. New York [etc.] : McGraw-Hill, cop. 1990