

66224 - Water Quality and Treatment

Información del Plan Docente

Academic Year	2018/19
Subject	66224 - Water Quality and Treatment
Faculty / School	110 - Escuela de Ingeniería y Arquitectura
Degree	531 - Master's in Chemical Engineering
ECTS	6.0
Year	
Semester	Half-yearly
Subject Type	Optional
Module	---

1.General information

1.1.Aims of the course

1.2.Context and importance of this course in the degree

1.3.Recommendations to take this course

2.Learning goals

2.1.Competences

2.2.Learning goals

2.3.Importance of learning goals

3.Assessment (1st and 2nd call)

3.1.Assessment tasks (description of tasks, marking system and assessment criteria)

4.Methodology, learning tasks, syllabus and resources

4.1.Methodological overview

The methodology followed in this course is oriented towards achievement of the learning objectives. It includes both theory and practice and it 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.

Classroom materials will be available via Moodle. These include a repository of the lecture notes used in class, the course syllabus, as well as other course-specific learning materials (<http://moodle2.unizar.es/add/>)

4.2. Learning tasks

The course includes the following learning tasks:

- Lectures (TP1): 35 hours.
- Practice sessions (TP2): 15 hours. Exercises and case studies will be done in order to complement the theory sessions.
- Laboratory sessions (TP3): 7 hours. Two sessions which take place in the laboratory.
- Field work: 3 hours. One session.
- Guided case studies (TP6): 14 hours. Guidance, monitoring and evaluation of guided assignments.
- Assessment (TP8): 10 hours.
- Autonomous work and study (TP7): 52 hours.
- Tutorials: 14 hours.

4.3. Syllabus

The course will address the following topics:

SECTION 1. WATER POLLUTION CONTROL LEGISLATION (B1)

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

SECTION 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. Pressure and impact assessment: Pollution Risk Quantification.

SECTION 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.

SECTION 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 agglomerations. 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 CONTAINING NON-BIODEGRADABILITY

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SUBSTANCES"

- Session 1: Treatment at laboratory scale (PL1)
- Session 2: Treatment Simulation by Superpro Designer V9.0 (PL2)

FIELD WORK (PC). "ASSESSMENT OF ECOLOGICAL STATUS OF THE EBRO RIVER'S WATER IN ZARAGOZA"

4.4.Course planning and calendar

Provisional course planning

WEEK	THEORY, EXERCISES AND TTs DELIVERY (TP1, TP2 and TP6)		
	h1	h2	h3
1	Course Presentation	B1	B1
2	B1	B1	B1
3	B1	B2	B2
4	B2	B2	B2
5	B2	B2	B2
6	B2	B2	B2
7	B3	B3	B3
8	B3	B3	B3
9	B3	B3	B3
10	B3	B3	B3
11	B3	B4	B4
12	B4	B4	B4

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13	B4	B4	B4
14	B4	B4	B4
15	B4	B4	B4
Next	EXAM (TP8)		

4.5. Bibliography and recommended resources