UNIVERSIDAD DE CASTILLA - LA MANCHA

GUÍA DOCENTE

1. General information

Course:	ENVIRONMENTAL ENGINEERING	**Code:**	38338
Type:	CORE COURSE	**ECTS credits:**	6
Degree:	345 - UNDERGRADUATE DEGREE PROGRAMME IN CIVIL ENGINEERING	**Academic year:**	2022-23
Center:	603 - E.T.S. CIVIL ENGINEERS OF CR	**Group(s):**	20
Year:	3	**Duration:**	First semester
Main language:	Spanish	**Second language:**	English
Use of additional languages:		**English Friendly:**	Y
Web site:		**Bilingual:**	N

Lecturer: **LUIS RODRIGUEZ ROMERO** - Group(s): **20**

Building/Office	Department	Phone number	Email	Office hours
A50	INGENIERÍA QUÍMICA	926052491	luis.rromero@uclm.es	Viernes 10-12 h

Lecturer: **DAVID SANCHEZ RAMOS** - Group(s): **20**

Building/Office	Department	Phone number	Email	Office hours
Politécnico 2-A51	CIENCIA Y TECNOLOGÍA AGROFORESTAL Y GENÉTICA	926052111	david.sanchezramos@uclm.es	

2. Pre-Requisites

Students must have passed the 2nd year subject "Applied Ecology for Civil Engineering".

3. Justification in the curriculum, relation to other subjects and to the profession

This subject is based on two of the competences included in the order CIN/307/2009 relative to the degrees that qualify for the exercise of the career of Ingeniero Técnico de Obras Públicas in Spain. Both competences belong to the specific technology module for the specialty of Hydrology; They are the following:

- Knowledge of urban services projects related to water supply and th sewer systems.
- Knowledge and understanding of the systems of drinking water and wastewater treatment, as well as its sizing, construction and conservation.

So, the purpose of this subject is to provide the student with knowledge related to understanding and sizing of drinking water and wastewater treatment systems, pertaining to the specialization in Hydrology of the degree in Civil and Territorial Engineering. More specifically, this subject focuses on the quality and composition of natural water, its pollution from urban and industrial uses and water treatment technologies. This subject is complementary to "Project Work: Supply and Sewer Networks", which takes place in the 2nd semester of the 3rd year, and "Project Work: River and Water Planning", which takes place in the 1st semester of the 4th year. Likewise, the students have previously completed the subject "Applied Ecology for Civil Engineering" (2nd year), which serves as the basis for several issues developed in this subject.

4. Degree competences achieved in this course

Course competences

Code	Description
CE35	Students have the capacity for integrated management and sustainable use of water and energy resources.
CG02	Students can use proper oral and written communication
H03	Students have knowledge of municipal utilities projects related to water supply and sanitation.
H04	Students have knowledge and understanding of water supply and sanitation systems, as well as their planning, construction and maintenance.

5. Objectives or Learning Outcomes

Course learning outcomes

Description

Knowledge of basic technology for the management of solid urban waste and basic types of air pollution and how to control it

Knowledge of the basic technology of drinking water and wastewater treatment plants

Knowledge of the fundamental aspects of chemistry and microbiology for sanitary and environmental engineering

Knowledge of the main physico-chemical, biological and ecological aspects of water pollution

6. Units / Contents

Unit 1: GENERAL CONCEPTS

- **Unit 1.1** Environmental and Sanitary Engineering: origin, evolution and concept
- **Unit 1.2** Public health and human demography
- **Unit 1.3** Fundamentals of microbiology
- **Unit 1.4** Fundamentals of environmental chemistry

Unit 2: MUNICIPAL WASTES AND ATMOSPHERIC POLLUTION

- **Unit 2.1** Municipal Wastes: collection

Unit 2.2 Municipal Wastes: treatment and landfilling
Unit 2.3 Atmospheric pollution

Unit 3: WATER QUALITY
Unit 3.1 Water management
Unit 3.2 Natural water
Unit 3.3 Water pollution
Unit 3.4 Water quality control
Unit 3.5 Water quality in rivers
Unit 3.6 Pollution of lakes, reservoirs and aquifers

Unit 4: WATER SUPPLY TREATMENT
Unit 4.1 Introduction to water supply treatment
Unit 4.2 Coagulation-Flocculation
Unit 4.3 Sedimentation
Unit 4.4 Filtration
Unit 4.5 Disinfection

Unit 5: WASTEWATER TREATMENT
Unit 5.1 Introduction to wastewater treatment
Unit 5.2 Conventional wastewater treatment
Unit 5.3 Wastewater treatment in small populations
Unit 5.4 Water reuse

7. Activities, Units/Modules and Methodology

Training Activity	Methodology	Related Competences (only degrees before RD 822/2021)	ECTS	Hours	As	Com	Description
Class Attendance (theory) [ON-SITE]	Lectures	CE35 H03 H04	1.6	40	N	-	Master classes with the use of PowerPoint presentations previously provided to students. This activity will be assessed through progress tests and/or through the final and/or retake exams.
Problem solving and/or case studies [ON-SITE]	Workshops and Seminars	CE35 CG02 H04	0.4	10	Y	Y	Problem-solving seminars or case studies provided in advance to students for individual or group resolution. Before the start of the seminars, the students must deliver the solved exercises to the teacher (the requirements for the document to be submitted will be specified in the virtual campus). During the seminars, the problems are solved on the blackboard by the students. It is a recoverable activity by taking an exam of problems in the final and/or retake exams.
Laboratory practice or sessions [ON-SITE]	Practical or hands-on activities	CE35 H03 H04	0.3	7.5	Y	Y	Laboratory practices related to the subject and visits to water and/or municipal waste treatment plants. It is a recoverable activity by taking an exam of laboratory practice in the final and/or retake exams.
Study and Exam Preparation [OFF-SITE]	Self-study	CE35 H03 H04	3.6	90	N	-	Study and/or preparation of tests and the other assessment activities, to be carried out by the student in an autonomous way.
Mid-term test [ON-SITE]	Assessment tests	CE35 H03 H04	0.05	1.25	Y	Y	Two mid-term tests, each comprising several lessons. It is a recoverable activity by taking an evaluation test in the final and/or retake exams.
Final test [ON-SITE]	Assessment tests	CE35 H03 H04	0.05	1.25	Y	Y	Final assessment test, which will cover the formative activities not passed.
		Total:	**6**	**150**			
		Total credits of in-class work: 2.4					**Total class time hours: 60**
		Total credits of out of class work: 3.6					**Total hours of out of class work: 90**

As: Assessable training activity
Com: Training activity of compulsory overcoming (It will be essential to overcome both continuous and non-continuous assessment).

8. Evaluation criteria and Grading System

Evaluation System	Continuous assessment	Non-continuous evaluation*	Description
			Two mid-term tests will be carried out throughout the year, each comprising several lessons. To pass this type of evaluation,

Mid-term tests	60.00%	65.00%	students will need to have taken all the tests and obtain an average mark of 4 or more points in the set of all the tests. This part of the assessment is recoverable through the final and/or retake exams. In the case of non-continuous evaluation (NCE), there will only be a single test in the final and/or retake exams.
Assessment of problem solving and/or case studies	20.00%	25.00%	It will involve the delivery of solved problems or exercises proposed by the teacher. It is mandatory to attend at least 75% of the problem seminars and to obtain an average mark of 4 or more points in the resolution of the proposed problems. The evaluation of this training activity is recoverable in the final exams, through the final and/or retake exams, which will include several problems. In the case of NCE, there will only be a single problem-solving test in the final and/or retake exams.
Assessment of active participation	10.00%	0.00%	Attendance with active participation at theory classes and problem seminars will be valued. This part of the assessment is non-recoverable.
Laboratory sessions	10.00%	10.00%	Laboratory practices and visits to water treatment plants are mandatory. Learning is assessed by means of a written exam which must be passed with a minimum score of 4 out of 10.
Total:	**100.00%**	**100.00%**	

According to art. 4 of the UCLM Student Evaluation Regulations, it must be provided to students who cannot regularly attend face-to-face training activities the passing of the subject, having the right (art. 12.2) to be globally graded, in 2 annual calls per subject , an ordinary and an extraordinary one (evaluating 100% of the competences).

Evaluation criteria for the final exam:

Continuous assessment:

The evaluation criteria for each of the formative activities and their relative weights in the final grade are those specified in the table above. To pass the course without having to take a final assessment test, at least 5 points must be obtained in the overall grade, provided that the following requirements are met: (i) have completed the two mid-term tests and obtained a minimum average grade of 4 out 10 points in the set of all the tests; (ii) have attended to at least 75% of the problem seminars and have obtained a minimum score of 4 out 10 in the resolution and delivery of the proposed problems; (iii) have carried out the laboratory practices and have obtained a minimum score of 4 out 10 in the corresponding exam. If any of these three requirements are not met, students will have to take a final exam that includes the sections not passed (theory, problems and/or practice exams). The grades obtained in the passed activities will be saved until the following academic year.

Unless stated otherwise, continuous evaluation criteria will be applied to all students. Anyone choosing non-continuous assessment must notify it to the lecturer within the class period of the subject. The option is only available if the student¿s participation in evaluation activities (from the continuous assessment) has not reached 50% of the total evaluation for the subject.

Non-continuous evaluation:

The non-continuous evaluation will consist of a final exam that will include questions of theory, whose weight in the final grade will be 65%, and several problems, whose weight will be 25% of the final grade. The remaining 10% will correspond to the completion of the compulsory laboratory practices and the passing of the corresponding exam.

To pass the course in NCE, it is necessary to obtain a minimum score of 4 points out of 10 in the evaluation of each of the 3 training activities, and to obtain a minimum of 5 points in the average mark.

Specifications for the resit/retake exam:

The retake exam will include the activities not passed in the final exam. For the retake exam, the assessment type used for the final exam will remain valid.

Specifications for the second resit / retake exam:

The second retake exam will include the activities not passed in the previous academic year which will be assessed in the same way as previously described for the final and retake exams.

9. Assignments, course calendar and important dates

Not related to the syllabus/contents

Hours	**hours**
Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]	7.5
Study and Exam Preparation [AUTÓNOMA][Self-study]	90
Mid-term test [PRESENCIAL][Assessment tests]	1.25
Final test [PRESENCIAL][Assessment tests]	1.25

General comments about the planning: The dates of the planning are indicative and may be modified according to the progress of the course.

Unit 1 (de 5): GENERAL CONCEPTS

Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	7
Problem solving and/or case studies [PRESENCIAL][Workshops and Seminars]	3
Group 21:	
Initial date: 01-09-2022	**End date:** 15-09-2022
Group 20:	
Initial date: 01-09-2022	**End date:** 15-09-2022

Unit 2 (de 5): MUNICIPAL WASTES AND ATMOSPHERIC POLLUTION

Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	5
Problem solving and/or case studies [PRESENCIAL][Workshops and Seminars]	1
Group 20:	
Initial date: 19-09-2022	**End date:** 26-09-2022
Group 21:	
Initial date: 19-09-2022	**End date:** 26-09-2022

Unit 3 (de 5): WATER QUALITY	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	15
Problem solving and/or case studies [PRESENCIAL][Workshops and Seminars]	3
Group 20:	
Initial date: 27-09-2022	**End date:** 27-10-2022
Group 21:	
Initial date: 27-09-2022	**End date:** 27-10-2022
Unit 4 (de 5): WATER SUPPLY TREATMENT	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	7
Problem solving and/or case studies [PRESENCIAL][Workshops and Seminars]	1.5
Group 20:	
Initial date: 31-10-2022	**End date:** 18-11-2022
Group 21:	
Initial date: 31-10-2022	**End date:** 18-11-2022
Unit 5 (de 5): WASTEWATER TREATMENT	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	6
Problem solving and/or case studies [PRESENCIAL][Workshops and Seminars]	1.5
Group 20:	
Initial date: 21-11-2022	**End date:** 29-11-2022
Group 21:	
Initial date: 21-11-2022	**End date:** 29-11-2022
Global activity	
Activities	**hours**
Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]	7.5
Study and Exam Preparation [AUTÓNOMA][Self-study]	90
Class Attendance (theory) [PRESENCIAL][Lectures]	40
Problem solving and/or case studies [PRESENCIAL][Workshops and Seminars]	10
Mid-term test [PRESENCIAL][Assessment tests]	1.25
Final test [PRESENCIAL][Assessment tests]	1.25
	Total horas: 150

10. Bibliography and Sources

Author(s)	Title/Link	Publishing house	Citv	ISBN	Year	Description
Allan, David J.	Stream Ecology: Structure and Function of Running Waters	Kluwer Academic		978-1-4020-5582-9	2007	
American Public Health Association	Standard methods for the examination of water and wastewater	American Public Health Association		0-87553-235-7	1998	
Atlas, Ronald M.	Ecología microbiana y microbiología ambiental	Addison Wesley		84-7829-039-7	2002	
Colomer Mendoza, Francisco José	Tratamiento y gestión de residuos sólidos /	Universidad Politécnica,		978-84-8363-071-6	2007	
Henry, J. Glynn	Ingeniería ambiental	Prentice Hall Hispanoamericana		970-17-0266-2	1999	
Kiely, Gerard	Ingeniería ambiental: fundamentos, entornos, tecnologías y s	McGraw-Hill		84-481-2039-6	2003	
Lin, Shun Dar	Water and wastewater calculations manual	McGraw-Hill		978-0-07-147624-9	2007	
Madigan, Michael T.	Biology of microorganisms	Prentice Hall		0-13-049147-0	2003	
Ortega E., Ferrer Y., Salas J.J., Aragón C. y Real A.	Manual para la implantación de sistemas de depuración en pequeñas poblaciones	Ministerio de Medio Ambiente y Medio Rural y Marino		978-84-491-1071-9	2010	
Sigee, David C.	Freshwater microbiology: biodiversity and dynamic interactio	John Wiley & Sons		0-471-48529-2	2006	
Suárez J., Jácome A., Temprano J. y Tejero I.	Introducción a la Ingeniería Sanitaria y Ambiental	Universidad de La Coruña			2006	Apuntes de clase. Universidad de La Coruña (disponible en Campus Virtual)
Wetzel, Robert G.	Limnology: lake and river ecosystems	Academic Press		0-12-7444760-1	2001	
	Lake and Reservoir Management	Elsevier Science		0-444-51678-6	2005	
	Wastewater engineering: treatment and reuse	McGraw-Hill		007-124140-X	2004	
E. Ortega, Y. Ferrer, J.J. Salas, C. Aragón, A. Real	Manual para la implantación de sistemas de depuración en pequeñas poblaciones	Ministerio de Medio Ambiente, Medio Rural y Marino	Madrid	9788449110719	2010	