DEGREE CURRICULUM

ENVIRONMENTAL ENGINEERING

Coordination: PALATSÍ CIVIT, JORGE MANUEL

Academic year 2023-24

ENVIRONMENTAL ENGINEERING 2023-24

Subject's general information

<table>
<tr><td>Subject name</td><td>ENVIRONMENTAL ENGINEERING</td></tr>
<tr><td>Code</td><td>102482</td></tr>
<tr><td>Semester</td><td>2nd Q(SEMESTER) CONTINUED EVALUATION</td></tr>
<tr><td>Typology</td><td>
<table>
<tr><th>Degree</th><th>Course</th><th>Character</th><th>Modality</th></tr>
<tr><td>Bachelor's Degree in Forest Engineering</td><td>4</td><td>OPTIONAL</td><td>Attendance-based</td></tr>
<tr><td>Double degree: Bachelor's degree in Forest Engineering and Bachelor's degree in Nature Conservation</td><td>5</td><td>OPTIONAL</td><td>Attendance-based</td></tr>
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<tr><td>Course number of credits (ECTS)</td><td>6</td></tr>
<tr><td>Type of activity, credits, and groups</td><td>
<table>
<tr><th>Activity type</th><td>PRACAMP</td><td>PRAULA</td><td>TEORIA</td></tr>
<tr><th>Number of credits</th><td>0.4</td><td>2.8</td><td>2.8</td></tr>
<tr><th>Number of groups</th><td>1</td><td>1</td><td>1</td></tr>
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<tr><td>Coordination</td><td>PALATSÍ CIVIT, JORGE MANUEL</td></tr>
<tr><td>Department</td><td>ENVIRONMENT AND SOIL SCIENCES AND CHEMISTRY</td></tr>
<tr><td>Teaching load distribution between lectures and independent student work</td><td>40% classes
60% personal work</td></tr>
<tr><td>Important information on data processing</td><td>Consult this link for more information.</td></tr>
<tr><td>Language</td><td>Catalan 90%
Spanish: 10%</td></tr>
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ENVIRONMENTAL ENGINEERING 2023-24

Teaching staff	E-mail addresses	Credits taught by teacher	Office and hour of attention
COLLADO SANTOLARIA, NOEMI	noemi.collado@udl.cat	,6	
PALATSÍ CIVIT, JORGE MANUEL	jordi.palatsi@udl.cat	5,4	

Learning objectives

The objective of the subject is that the student acquires the knowledge that allows him to defend with technical arguments an option of action (management and treatment) at the time of managing and treating waste of the agricultural, agri-food and foresty activity.

Competences

Basic skills

CB1. That students have demonstrated and understand knowledge in an area of study that starts from the basis of general secondary education, and is usually found at a level that, while supported by advanced textbooks, also includes some aspects that involve knowledge from the forefront of their field of study.

CB2.That students know how to apply their knowledge to their work or vocation in a professional way and possess the skills that are usually demonstrated through the elaboration and defense of arguments and the resolution of problems within their area of study

CB3 That students have the ability to gather and interpret relevant data (usually within their area of study) to make judgments that include reflection on relevant social, scientific or ethical issues.

CB4 That students can transmit information, ideas, problems and solutions to both a specialized and non-specialized audience.

CB5. That students have developed those learning skills necessary to undertake further studies with a high degree of autonomy.

General skills

CG2. Ability to analyze the structure and ecological function of forest systems and resources, including landscapes.

CG3. Conocimiento de los procesos de degradación que afecten a los sistemas y recursos forestales (contaminación, plagas y enfermedades, incendios, etc.) y capacidad para el uso de las técnicas de protección del medio forestal, de restauración hidrológico forestal y de conservación de la biodiversidad.

CG4. Ability to evaluate and correct the environmental impact, as well as apply the techniques of auditing and environmental management.

CG7. Ability to solve the technical problems arising from the management of natural spaces.

Subject contents

Theory classes and problems

I.1 Concept of waste and impact. European, Spanish and Catalan environmental policy and legislative principles. Classification of waste. Minimization of waste at source. Controls in soil, water and atmosphere. Competent administrations and documentation 0.2 c

I.2 Description and characterization of waste, emissions and waste water. Organic matter (COD/BOD), nutrients and other emerging pollutants. 0.6 c

Theory classes and problems

T1. Wastewater pre-treatments. Measurement of flows and sampling of residual currents. Homogenization and equalization of pollutant loads. Rough grids (hydraulic calculations). Fine sieves (technologies and sizing). Degreasers and degreasers (discrete sedimentation, efficiency and sizing). Problem solving. 1.5 c

T2 Primary Treatment. Sedimentation, coagulation and flocculation. Types of non-discrete sediments. Design of primary clarifiers. Technologies in industry. Troubleshooting 0.5c

T3_0 Secondary treatment. Microbiological bases, kinetics and stoichiometry of reactions. Microbial metabolism and growth. Inhibition processes. Competition and antagonism. Kinetic and stoichiometric expressions. Efficiencies and bacterial growth rates. Heterotrophic elimination of organic matter. Removal of nutrients (N and P). Anaerobic metabolism. Biological tests (aerobic and anaerobic biodegradability of substrates). Mathematical models (0.2c)

T3_1 Secondary treatment. Aerobic, facultative and anaerobic gaps. Algae/bacteria symbiosis. Stabilization and maturation gaps. Purpura bacteria.0.1c

T3_2 Secondary treatment. Biofilters and fixed biomass systems. Biofilms. Technologies and design parameters .0.1c

T3_3 Secondary treatment. Activated sludge technology. Types of reactors. Sizing and efficiency parameters. External recirculation and sludge production. Secondary settling and sludge purging. Calculation and dimensioning problems of activated sludge systems, for the removal of organic matter and nutrients. Chemical precipitation of phosphorus 0.4c

T3_4 Oxygen transfer and process control. Aeration technologies and systems. Sensors and control systems 0.2c

T4. Tertiary treatments. Regeneration of waste water. Treatment technologies. Membrane processes. Disinfection Reuse regulations 0.1c

T5_1 Sludge treatment. Thickening and flotation. Dimensioning and design of thickeners. Problem Solving.0.1c

T5_2 Anaerobic waste water treatment technologies (UASB, EGSB and IC).0.1c

T5_3 Biogas and bio-methane. Utilization and upgrading technologies. Facilities.0.1c

T5_4 Sludge treatment. Sludge dewatering technologies. Problem solving and consumption estimation 0.1c

T5_5 Sludge treatment. Anaerobic digestion + Composting + agricultural application. 0.6 c

T6. Other waste water treatment technologies. (SBRs, MBBRs/IFAs, MBR&AnMBR). Examples of industrial installations. Aerobic granular biomass and Annamox. 0.2h

T7. Other bio-chemical processes (biodiesel, bioethanol) thermochemical processes (combustion, pyrolysis and gasification) and controlled waste deposits 0.1c

T8. Gaseous emission treatment 1.2c

Practical activities

Classroom and laboratory practices:

Determination of pollution parameters (0.2c)

Macro and microscopic identification of activated sludge. V30, protists and filamentous microorganisms 0.2c

Visit: Visit to treatment facilities 0.8c

Methodology

Methodological axes of the subject

Type of activity	Description	Student face-to-face activity		Student non-face-to-face activity		Assessment	Total time
		Objetives	Time (h)	Student work	Time (h)	Time(h)	Hours/ECTS
Master class	Master class (Classroom. Large group)	Explanation of the main concepts	30	Study: to know, understand and synthesize knowledge	50	2.0	3.6
Problems and study cases	Participatory (Classroom. Large group)	Study case and problem resolution	14	Learn to solve problems and casess	34	2	2.0
Visit	Visit to a plant	On-site knowledge of process lines	8	Report on the visit	2		0.24
Lab practical work	Student work	Identification of activated sluge	2	Compose a report	4		0,16
Total			58		88	4	6,0

Development plan

Type of activity	Description	Student face-to-face activity		Student non-face-to-face activity		Assessment	Total time
		Objetives	Time (h)	Student work	Time (h)	Time(h)	Hours/ECTS
Master class	Master class (Classroom. Large group)	Explanation of the main concepts	30	Study: to know, understand and synthesize knowledge	50	2.0	3.6

Problems and study cases	Participatory (Classroom. Large group)	Study case and problem resolution	**14**	Learn to solve problems and casess	**34**	**2**	**2.0**
Visit	Visit to a plant	On-site knowledge of process lines	**8**	Report on the visit	**2**		**0.24**
Lab practical work	Student work	Identification of activated sluge	2	Compose a report	**4**		**0,16**
Total			**58**		**88**	**4**	**6,0**

Evaluation

The assessment will consist of 4 blocks:

Block 1: Theoretical/practical written test

1 Theoretical and practical written test opens the contents of the subject program, with a weight of 30%. It will take place on the date proposed by the director of studies for the first partial exam. A minimum grade of 4/10 points must be obtained.

Block 2: Theoretical/practical written test

Written theoretical and practical test opens the contents of the subject's program, with a weight of 30%. It will take place on the date proposed by the director of studies for the second partial exam. A minimum grade of 4/10 points must be obtained.

Block 3: Exercises, visit reports or presentation of technologies It will have a weight of 40% of the grade. The delivery deadline will be the one indicated by the director of studies for the second partial exam of the subject.

Alternative assessment: Students who request an alternative assessment must take an exam on the date set by the director of studies for the second partial exam. The exam will include theory and problems from the entire subject and will have a weight of 100% of the grade.

Bibliography

The bibliography of the technological subjects requires a continuous revision. However, some manuals are cited whose content, despite being written in some cases more than a decade ago, is suitable for a first contact with the subject. At the beginning of the course, and eventually during the development of the subject, teachers will provide a more complete list of bibliographic sources, including portals and internet addresses with sector information.

References

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