

66240 - Alternative technologies for industrial wastewater treatment

Syllabus Information

Academic year: 2024/25

Subject: 66240 - Alternative technologies for industrial wastewater treatment

Faculty / School: 110 - Escuela de Ingeniería y Arquitectura

Degree: 531 - Master's in Chemical Engineering

ECTS: 3.0

Year:

Semester: First semester

Subject type: Optional

Module:

1. General information

The subject complements the training on water treatment issues, so that a solid training is acquired on the origin and treatment of industrial wastewater, in particular, those that are not assimilated to urban wastewater.

To take the subject, it is recommended to have knowledge of environmental engineering.

2. Learning results

- To predict whether an industry or industrial production process generates contaminated wastewater that is susceptible to treatment.
- To differentiate the treatments applicable to a wastewater assimilable to urban wastewater from those used for water with toxic or refractory pollutants from industry.
- To compare and select the different technologies that can be applied to a non-biodegradable industrial liquid waste.
- To design the selected technology for a given case with bibliographic data and/or data supplied by a real company.
- To deepen and apply the knowledge exposed in other subjects in order to design advanced or alternative technologies in purification.
- To apply commercial computer tools for the design of ion exchange and reverse osmosis units.
- To compare the technologies explained in the theoretical classes with those observed in company visits.

3. Syllabus

Theory program

1.- INDUSTRIAL WASTEWATER: Industrial wastewater problems. Specific pollutants in industrial wastewater. Industrial effluents produced in different sectors. Technologies for purification of specific pollutants.

2.-MEMBRANE PURIFICATION: Reverse osmosis, nanofiltration. Microfiltration, ultrafiltration

3.- PURIFICATION BY ELECTROCHEMICAL PROCESSES: Electroplating. Electrodialysis and electrohydrolysis. Electrooxidation. Electrocoagulation and electroflotation

4.- ADSORPTION PURIFICATION: Coal. New materials. Ion exchange.

5.-PURIFICATION BY CHEMICAL PROCESSES. Advanced oxidation. Wet oxidation. Oxidation in supercritical water.

Practical program:

Design of ion exchange processes (practice 1) and reverse osmosis membranes (practice 2) using WAVE software.

4. Academic activities

- **Participative master class(17h.)**. Presentation of theoretical contents of the different topics proposed.
- **Problem solving classes and case studies (7 h)**. Problem solving in coordination with theory.
- **Simulation practices (4 h)**. Use of the commercial program WAVE to simulate reverse osmosis and ion exchange processes.
- **Special practices: (2 h)** Visit to an industrial effluent treatment plant.
- **Tutored work: (10 h)**. Completion of the application work or case study, as well as the preparation of the presentation and/or discussion.
- **Study and personal work (32 h)**
- **Assessment tests (3 h)**

5. Assessment system

The subject will be evaluated by the continuous assessment system by means of the following activities:

1. Writing of a scientific-technical report (30% of the grade). Creation and oral presentation of an individual work on a topic proposed by the teacher. The evaluation will consider the autonomy, the quality and originality of the solution, and the analytical and critical capacity of the student.
2. Oral presentation and discussion of the scientific-technical report (20% of the grade). The ability to summarise and debate in class will be valued.
3. Reports corresponding to the practice sessions (20% of the grade).
4. Quiz on the visit to a sewage treatment plant (10% of the grade).
5. Objective multiple-choice test (20% of the total grade) after the master class.

No minimum grade is required for averaging between the different parts.

If the student has not passed any of these activities during the semester, they will have the opportunity to pass the subject by means of a global test in the two official calls.

6. Sustainable Development Goals

- 6 - Clean Water and Sanitation
- 9 - Industry, Innovation and Infrastructure
- 12 - Responsible Production and Consumption