MAPR2643 Treatment of liquid effluents

[30h+7.5h exercises] 4 credits

This course is taught in the 1st semester

Teacher(s): Spyridon Agathos, Léon Duvivier
Language: English
Level: Second cycle

Aims

Treatment of aqueous industrial effluents in view of their clean elimination or discharge and of their valorisation via recycling of the useful substances contained therein

Main themes

- The course covers the physical and chemical characterisation of aqueous effluents that are polluted by heavy metals and organic substances. One half of the course is devoted to "inorganic" aqueous effluents. In this part are studied the main treatment techniques of these effluents by physical or chemical approaches (chemical precipitation - ion exchange resins - liquid-liquid extraction - adsorption - stripping - reverse osmosis - flotation - electrodialysis). The principles and techniques developed in the course are largely illustrated by means of concrete cases of effluents. An important place is given also to particular problems affecting the water used in the feed of industrial processes.
The other half of the course is devoted to "organic" aqueous effluents. It covers essentially the main techniques of biological treatment of liquid effluents. Specific topics include:
1. Introduction into the problems exerted by aqueous industrial effluents and characterisation of the various technological options in existence for their treatment and safe discharge.
2. Overview of biological treatments. Definitions, useful terms. The role of micro-organisms in cleanup processes. Metabolic and energetic classification of the main groups of micro-organisms involved in the treatment of wastewater.
3. Microbial treatment and bio-oxidation of organic polluting substances (substrates). Kinetics of substrate-limited microbial growth. Application of kinetic models to biological treatment sequences of effluents. Relations useful in the design and quantitative analysis of biotreatment processes.
4. Aerobic treatment processes using microbial growth in suspension. Activated sludge treatment plants. Aerated lagoons and oxidation ditches. Aerobic treatment processes using attached microbial growth. Trickling filters.
5. Anaerobic treatment processes using suspended and attached microbial growth.

Content and teaching methods

Nil

Other information (prerequisite, evaluation (assessment methods), course materials recommended readings, ...)

Nil

Other credits in programs

BIR22/4C	Deuxième année du programme conduisant au grade de bio-ingénieur : Chimie et bio-industries (Technologies environnementales: eau, sol, air)	(4 credits)	
BIR22/4E	Deuxième année du programme conduisant au grade de bio-ingénieur : Sciences et technologie de l'environnement (Technologies environnementales: eau, sol, air)	(4 credits)	
BIR23/4E	Troisième année du programme conduisant au grade de bio-ingénieur : sciences et technologie de l'environnement (Technologies environnementales: eau, sol, air)	(4 credits)	
ENVI3DS/1	Diplôme d'études spécialisées en science et gestion de l'environnement (Industrie et environnement)	(4 credits)	Mandatory
ENVI3DS/2	Diplôme d'études spécialisées en science et gestion de l'environnement (Agriculture et environnement)	(4 credits)	Mandatory
GC22	Deuxième année du programme conduisant au grade d'ingénieur civil des constructions	(4 credits)	
INCH23	Troisième année du programme conduisant au grade d'ingénieur civil chimiste	(4 credits)	Mandatory
MATR23	Troisième année du programme conduisant au grade d'ingénieur civil en science des matériaux	(4 credits)	