AMCO2191 Geoenvironment

[30h+15h exercises] 4 credits

This course is taught in the 2nd semester

Teacher(s): Alain Holeyman
Language: French
Level: Second cycle

Aims

Provide engineering students basic notions concerning environmental problems connected with soils and groundwater

Main themes

Knowledge:
- Transport phenomena of solute and non aqueous contaminants in the soil and groundwater, under saturated and unsaturated conditions
- Remediation process and technologies; landfill design considerations
Know-how:
- Integrate basic engineering disciplines (soil mechanics, transport in porous media, physics and chemistry) to analyze transport and fate of pollutants in soil and groundwater
- Assess feasibility and select best available method to limit impact of contaminating source and to remediate affected subsurface media (soil and groundwater)

Content and teaching methods

Part A (2 ECTS): Principles of transport phenomena in soils
- Introduction: historical background, geotechnical environmental engineering.
- Transport of solute contaminants: constitutive equations, advection, diffusion, hydrodynamical dispersion, adsorption et retardation, degradation, advection-dispersion equation, laboratory and field tests for characterization.
- Transport of pollutants in the non saturated soil phases: basic principles (capillarity, retention, relative permeability), migration of light and dense non aqueous phase liquids.
Part B (2 ECTS): Remediation processes and technologies
- Introduction: regulations, source et nature of contaminants.
- Source control (excavation, isolation, hydrodynamic confinement, Landfilling)
- Physio-chemical and biological methods : in-situ, on-site et ex-situ (pump and treat, soil vapor extraction, in-situ bio-remediation, combination of methods)
Lectures are delivered in auditoria while exercises are administered in seminars. Part B features case histories to illustrate the application of remediation techniques.

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

Prerequisit : AUCE 1173, Transport phenomena

Programmes in which this activity is taught

BIR2	Bio-ingénieur
ENVI3DS	Diplôme d'études spécialisées en science et gestion de l'environnement

Other credits in programs

ARCH22	Deuxième année du programme conduisant au grade d'ingénieur civil architecte	(4 credits)	
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/4	Diplôme d'études spécialisées en science et gestion de l'environnement (Administration publique, environnement)	(4 credits)	Mandatory
GC21	Première année du programme conduisant au grade d'ingénieur civil des constructions	(4 credits)	Mandatory