

|             |                 |    |
|-------------|-----------------|----|
| 5.0 credits | 45.0 h + 15.0 h | 2q |
|-------------|-----------------|----|

|                              |   |
|------------------------------|---|
| Teacher(s) :                 | Bolly Pierre-Yves ; Holeyman Alain ;  |
| Language :                   | Français  |
| Place of the course          | Louvain-la-Neuve  |
| Main themes :                | <p>Knowledge:</p> <ul style="list-style-type: none"> <li>- Transport phenomena of solute and non aqueous contaminants in the soil and groundwater, under saturated and unsaturated conditions</li> <li>- Remediation process and technologies; landfill design considerations</li> </ul> <p>Know-how:</p> <ul style="list-style-type: none"> <li>- Integrate basic engineering disciplines (soil mechanics, transport in porous media, physics and chemistry) to analyze transport and fate of pollutants in soil and groundwater</li> <li>- Assess feasibility and select best available method to limit impact of contaminating source and to remediate affected subsurface media (soil and groundwater)</li> </ul>   |
| Aims :                       | <p>Provide engineering students basic notions concerning environmental problems connected with soils and groundwater</p> <p><i>The contribution of this Teaching Unit to the development and command of the skills and learning outcomes of the programme(s) can be accessed at the end of this sheet, in the section entitled "Programmes/courses offering this Teaching Unit".</i></p>  |
| Content :                    | <p>Part A (2 ECTS): Principles of transport phenomena in soils</p> <ul style="list-style-type: none"> <li>- Introduction: historical background, geotechnical environmental engineering.</li> <li>- Transport of solute contaminants: constitutive equations, advection, diffusion, hydrodynamical dispersion, adsorption et retardation, degradation, advection-dispersion equation, laboratory and field tests for characterization.</li> <li>- Transport of pollutants in the non saturated soil phases: basic principles (capillarity, retention, relative permeability), migration of light and dense non aqueous phase liquids.</li> </ul> <p>Part B (2 ECTS): Remediation processes and technologies</p> <ul style="list-style-type: none"> <li>- Introduction: regulations, source et nature of contaminants.</li> <li>- Source control (excavation, isolation, hydrodynamic confinement, Landfilling)</li> <li>- 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)</li> </ul> <p>Lectures are delivered in auditoria while exercises are administered in seminars. Part B features case histories to illustrate the application of remediation techniques.</p> |
| Other infos :                | Prerequisite : AUCE 1173, Transport phenomena   |
| Cycle and year of study :    | <p> <a href="#">&gt; Master [120] in Environmental Bioengineering</a><br/> <a href="#">&gt; Master [120] in Environmental Science and Management</a><br/> <a href="#">&gt; Master [120] in Chemistry and Bio-industries</a><br/> <a href="#">&gt; Master [120] in Civil Engineering</a> </p>  |
| Faculty or entity in charge: | GC  |