




3 credits

30.0 h

Q1

Teacher(s)	Bolly Pierre-Yves ;
Language :	English
Place of the course	Louvain-la-Neuve
Main themes	<p>The objective of this course is to learn how to manage the different scientific and technical aspects related to geoenvironmental hydrogeology. It contributes to the management of environmental risk, which is an integral part of the geotechnical engineer's job.</p> <p>The course has two parts:</p> <ul style="list-style-type: none"> <li>• The first part deals with hydrogeology: Fundamental principles of fluid flow in porous media are presented, as well as the methods applied in order to characterize and manage aquifer resources. Exercise sessions allow to understand practical problems related to the exploitation and management of groundwater (including the basics of geothermal / hydrothermal)</li> <li>• The second part deals with the geoenvironment: after an introduction regarding the quality of the subsoil in an industrial-polluted context, the different processes of migration and underground dispersion of contaminants are addressed. Environmental risk estimation methodologies using field data are used to illustrate the values of different soil remediation techniques. Special attention is given to non-aqueous liquid phase contaminants (NAPLs).</li> </ul>
Aims	<p>Regarding the AA reference system of the "Master of Civil Engineering Construction" program, this course contributes to the development, acquisition and evaluation of the following learning outcomes: AA1.1, AA1.2, AA1.3, AA2.1, AA2.2, AA2.3, AA2.5, AA5.1, AA5.3, AA5.5, AA6.2, AA6.3, AA6.4.</p> <p>At the end of this course, the student must be able to:</p> <p>Technical and engineering skills:</p> <ul style="list-style-type: none"> <li>• Identify and classify industrial contaminants considering their physicochemical properties and their risks for human health</li> <li>• Understand groundwater transport and balance between the different soil phases (solid, liquid, gas)</li> <li>• Characterize advection, diffusion, dispersion and attenuation processes in saturated soil and unsaturated soil, through laboratory and in situ tests</li> <li>• Evaluate the mobility of non-aqueous fluids (light and heavy) in a given geoenvironmental context</li> <li>• Display the methods of investigation (on-site and in laboratory) able to characterize contamination state of a given site</li> <li>• Determine hydrogeological parameters (transmissivity, storage, etc.) using in situ tests and transient pumping tests</li> <li>• Calculate flow velocities and drawdown induced by pumping under transient conditions</li> <li>• Pre-size a geothermal or hydrothermal installation</li> </ul> <p>Project management / managerial skills:</p> <ul style="list-style-type: none"> <li>• Evaluate the environmental risk following a pollution impacting groundwater</li> <li>• Propose a remediation plan for a given contaminated site</li> </ul> <p>Social skills :</p> <ul style="list-style-type: none"> <li>• Communicate effectively with teachers</li> </ul> <p>-----</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>
Evaluation methods	Written exam for the practical exercises, oral exam for the theory
Teaching methods	Lessons with PowerPoint supports, PDF and directed readings
Content	See "Mains themes"
Inline resources	PowerPoint slides and exercises are available on Moodle
Bibliography	A préciser

Other infos	Depending on the availabilities, a visit may be organized on-site (quarry, excavation, pumping station, ...)
Faculty or entity in charge	GC

<b>Programmes containing this learning unit (UE)</b>				
Program title	Acronym	Credits	Prerequisite	Aims
Master [120] in Civil Engineering	<a href="#">GCE2M</a>	3		
Master [120] in Chemistry and Bioindustries	<a href="#">BIRC2M</a>	3		
Master [120] in Environmental Bioengineering	<a href="#">BIRE2M</a>	3		
Master [120] in Environmental Science and Management	<a href="#">ENVI2M</a>	3		