






3.00 credits

30.0 h

Q1

Teacher(s)	Bolly Pierre-Yves ;
Language :	English > French-friendly
Place of the course	Louvain-la-Neuve
Prerequisites	Good knowledge of geomaterials and soil mechanics as taught in courses LGCIV1031 and LGCIV1072
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"> • 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) • 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).
Learning outcomes	<p>At the end of this learning unit, the student is able to :</p> <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, 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"> • Identify and classify industrial contaminants considering their physicochemical properties and their risks for human health • Understand groundwater transport and balance between the different soil phases (solid, liquid, gas) • Characterize advection, diffusion, dispersion and attenuation processes in saturated soil and unsaturated soil, through laboratory and in situ tests • Evaluate the mobility of non-aqueous fluids (light and heavy) in a given geoenvironmental context • Display the methods of investigation (on-site and in laboratory) able to characterize contamination state of a given site • Determine hydrogeological parameters (transmissivity, storage, etc.) using in situ tests and transient pumping tests • Calculate flow velocities and drawdown induced by pumping under transient conditions • Pre-size a geothermal or hydrothermal installation <p>Project management / managerial skills:</p> <ul style="list-style-type: none"> • Evaluate the environmental risk following a pollution impacting groundwater • Propose a remediation plan for a given contaminated site <p>Social skills :</p> <ul style="list-style-type: none"> • Communicate effectively with teachers
Evaluation methods	Exam in English (written for the practical exercises and the theory)
Teaching methods	Teaching in French, with supports in English and French
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

Programmes containing this learning unit (UE)				
Program title	Acronym	Credits	Prerequisite	Learning outcomes
Master [120] in Environmental Science and Management	ENVI2M	5		
Master [120] in Civil Engineering	GCE2M	3		
Master [120] in Environmental Bioengineering	BIRE2M	5		
Interdisciplinary Advanced Master in Science and Management of the Environment and Sustainable Development	ENVI2MC	3		
Master [120] in Chemistry and Bioindustries	BIRC2M	3		
Master [120] in Agriculture and Bio-industries	SAIV2M	3		