UCLouvain

lgciv2073

2019

Hydrogeology and Geoenvironment

In view of the health context linked to the spread of the coronavirus, the methods of organisation and evaluation of the learning units could be adapted in different situations; these possible new methods have been - or will be - communicated by the teachers to the students.

3 credits	30.0 h	Q1

Teacher(s)	Bolly Pierre-Yves ;
Language :	English
Place of the course	Louvain-la-Neuve
Main themes	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. The course has two parts: • 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).
Aims	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. At the end of this course, the student must be able to: Technical and engineering skills: • 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 1 • 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 Project management / managerial skills: • Evaluate the environmental risk following a pollution impacting groundwater • Propose a remediation plan for a given contaminated site Social skills : • Communicate effectively with teachers - - - - *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".*
Evaluation methods	**Due to the COVID-19 crisis, the information in this section is particularly likely to change.** Written exam for the practical exercises, oral exam for the theory
Teaching methods	**Due to the COVID-19 crisis, the information in this section is particularly likely to change.** 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

Programmes containing this learning unit (UE)

Program title	Acronym	Credits	Prerequisite	Aims
Interdisciplinary Advanced Master in Science and Management of the Environment and Sustainable Development	ENVI2MC	3		
Master [120] in Chemistry and Bioindustries	BIRC2M	5		
Master [120] in Environmental Science and Management	ENVI2M	5		
Master [120] in Civil Engineering	GCE2M	3		
Master [120] in Environmental Bioengineering	BIRE2M	5		
Master [120] in Agriculture and Bio-industries	SAIV2M	3		