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Teacher(s)	Agnan Yannick (coordinator) ;Maetz Philippe ;Rollin Xavier ;
Language :	French
Place of the course	Louvain-la-Neuve
Prerequisites	The present course uses notions in the following fields: « Transfert phenomena », « General and applied ecology », « Environmental law », « General hydrology », « Toxicology and ecotoxicology » et « Soil science » ; these notions are reminded in order to avoid any barrier to the general understanding of the course.
Main themes	<p>1. Concepts studied during the course :</p> <ul style="list-style-type: none"> - Soil and water quality. - Causes, mechanisms and consequences of water and soil alterations. - Legal contexts of soil and water protection. - Soil and water quality standards and their scientific bases. - Selection of physico-chemical, chemical, and biological diagnostic criterions for assessing water and soil quality. - The development and setting up of permanent monitoring programmes on water and soil quality. - The physico-chemical characteristics of pollutants that determine their behaviour (including transport) in soils and waters. - The principles of Risk Based Land Management. - Strategies and techniques for water treatment and soil remediation.
Learning outcomes	<p>At the end of this learning unit, the student is able to :</p> <p>a. <u>Contribution de l'activité au référentiel AA (AA du programme)</u> M.1.1 ; M.1.2 ; M.1.3 ; M.1.5., M. 2.1 ; M.2.2 ; M.2.3 ; M.4.5., M.4.7., M.7.1, M.7.2., M.7.3., M.8.1.</p> <p>b. <u>Formulation spécifique pour cette activité des AA du programme (maximum 10)</u> At the end of the activity the student should be able to :</p> <ul style="list-style-type: none"> - summarize the European legal framework on water quality and for soil protection ; - explain the concepts of "good ecological and chemical status" of water bodies, soil quality and soil degradation; - identify the main potential pollutants in waters and soils, as well as their main characteristics and properties, and explain the main mechanisms by which they could affect the different possible targets and produce an impact, at different spatial and temporal scales; - explain, and differentiate for soil and water, the concepts of the DPSIR analysis scheme, and the concepts of water- and land- use; <p>1</p> <ul style="list-style-type: none"> - list the key elements and indicators (physico-chemical, chemical, biological and hydromorphological) of water or soil pollution, prioritize and explain their methods of measurement; -define the concept of "quality standards" for water and soil, explain their scientific bases, critically interpret their values and use them adequately; - make a first interpretation of data concentrations of contaminants in soil and groundwater in terms of risk; - explain the principles of water flow and pollutant transport in soils, groundwater and surface waters; - propose a monitoring network focussing on either water or soil quality that would be based on defined objectives and development means ; for each kind of network : justify the choices made concerning the measuring station locations and types of indicators; - make good use of the legislations on water quality or on soil protection and contaminated site management; - make good use of the principles of Risk Based Land Management ; - identify, predict and justify the main treatment technologies for water treatment or for site remediation applicable for a given context.

<p>Bibliography</p>	<p>Partie générale</p> <ul style="list-style-type: none"> • Berg L.R., Hassenzahl D.M., Raven P.H. (2009). <i>Environnement</i>. De Boeck. 687 p. • Bliefert C., Perraud R. (2008). <i>Chimie de l'environnement : air, eau, sols, déchets</i>. De Boeck. 478 p. • Baird C., Cann M. (2016). <i>Chimie de l'environnement</i>. De Boeck. 832 p. <p>Partie "Eau"</p> <ul style="list-style-type: none"> • Benedini M., Tsakiris G. (2013). <i>Water quality modelling for river and streams</i>. Water Science and Technology Library, Vol. 70. Springer <p>Partie "Sol"</p> <ul style="list-style-type: none"> • Calvet R. (2019). <i>Les polluants dans le sol</i>. Editions France Agricole. 298 p. • Le Corfec Y. (2011). <i>Sites et sols pollués : gestion des passifs environnementaux</i>. Dunod. 424 p. • Atteia O. (2015). <i>Chimie et pollutions des eaux souterraines</i>, Tech & Doc Lavoisier. 448 p. <p>Partie "Air"</p> <ul style="list-style-type: none"> • Delmas R., Mégie G., Peuch V.-H. (2008). <i>Physique et chimie de l'atmosphère</i>. Edition Belin. 639 p. • Sportisse B. (2008). <i>Pollution atmosphérique : des processus à la modélisation</i>. Springer. 350 p.
<p>Other infos</p>	<p>This course can be given in English.</p>
<p>Faculty or entity in charge</p>	<p>AGRO</p>

Programmes containing this learning unit (UE)				
Program title	Acronym	Credits	Prerequisite	Learning outcomes
Master [120] in Biology of Organisms and Ecology	BOE2M	3		
Master [120] in Environmental Science and Management	ENVI2M	3		
Master [120] in Forests and Natural Areas Engineering	BIRF2M	3		
Master [120] in Environmental Bioengineering	BIRE2M	3		
Interdisciplinary Advanced Master in Science and Management of the Environment and Sustainable Development	ENVI2MC	3		
Master [120] in Agriculture and Bio-industries	SAIV2M	3		