LBIRE2103

2013-2014

General hydrology

5.0 credits	30.0 h + 22.5 h	1q

Teacher(s) :	Vanclooster Marnik (compensates Bielders Charles) ; Bielders Charles ; Vanclooster Marnik (coordinator) ;
Language :	Anglais
Place of the course	Louvain-la-Neuve
Inline resources:	Icampus
Prerequisites :	Principles of mass and energy transport phenomena Data processing (Excel ' spreadsheet, ...) Introduction to MATLAB technical computing
Main themes :	-Water resources issues at the field scale, regional, continental and global scale. - The various components of the hydrological cycle (rainfall, infiltration, runoff, drainage, subsurface flow, evapotranspiration): process description, mathematical modelling, measurement methods and interpretation - Hydrological modeling at the parcel and catchment scale - Hydrometrology - Flood control and water conservation
Aims :	a. Learning outcomes M1.1, , M1.3, M2.1, , M2.3, M 6.2 b.Specific formulation of learning outcomes At the end of the course (2.5 ECTS) and practical work (2.5 ECTS) , students will be able to: - understand and discuss, in a changing environmental context, the issues of water management at different spatial scales ; - describe the processes involved in the different terms of the water balance at the scale of the field parcel and the watershed ; - develop and interpret the equations that are used for describing these processes; - describe working principles of hydrometrological instruments, including the advantages and disadvantages of different instrumentation and monitoring techniques ; - interpret hydrological measurement data (rainfall , evapotranspiration, drainage, runoff) ; - use various hydrological models to calculate various terms of the water balance at the field parcel and watershed scale, with particular attention to the rainfall-runoff relationship in watersheds ; - propose and justify the choice of hydraulic infrastructure to regulate water flow at the catchment basin; - write a report on the practical work and critically analyze the results. *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 :	Oral examination with written preparation. Evaluation of the written report of the practical work and the excursion.
Teaching methods :	- The lectures are given in English, but illustrated by slights in French. A reference textbook in French supports the lectures. - Videos are used to illustrate some aspects of the course, in particular in relation to the section on infiltration and hydrologic modeling - Practical work in the computer room allow students to use advanced methods of hydrological analysis of field parcels and watersheds. - The practical work is a executed in a team. - A written report stimulates the communication skills of the student and allows evaluating the practical work; - The excursions allows illustrating the concepts of flood control and water conservation in the region.
Content :	Lectures : - Introduction: hydrological issues at different scales - The water balance at the parcel and catchment scale - The watershed characterization: hydro- geographical and functional characterization - Precipitation: process description, genesis, measurements, data interpretation. - Infiltration: process description, genesis, characterization and analysis. - Evapotranspiration: process description, genesis, characterization and analysis. - Runoff: process description, genesis, characterization and analysis. - Hydrological modeling: modeling phases , typology of hydrological models, illustrations of several modeling approaches, methods of calibration and inverse modeling, validation methods , sensitivity analysis.

	- Hydrometrology : flow measurement, processing and interpretation of the data, hydrological monitoring and collection of runoff. - Flood mitigation and water conservation: description of infrastructure for flood mitigation and water conservation. Practical work The theoretical aspects are illustrated by practical work in the computer room : - Geographical characterization of a watershed (boundary, topographical features) using GIS tools. - Characterization of rain : time series analysis, IDF diagrams, Thiessen polygon interpolation. - Modelling evapotranspiration : Analysis of meteorological data, estimation of evapotranspiration by the Penman-Monteith method. - Modelling of drainage of a field parcel and closing the water balance of the field parcel; - Modelling the rainfall-runoff relationship in watershed scale: Statistical modeling statistics, conceptual modeling , modeling with a spatially distributed hydrological model ; - Design of a storm basin. Two excursions allow illustrating course concepts in a regional setting
Bibliography :	Reference: General Hydrology ', A. Musy. Slight of the lectures on iCampus Syllabus for part evapotranspiration / infiltration
Cycle and year of study :	> Master [120] in Geography : General > Master [120] in Physics > Master [120] in Agricultural Bioengineering > Master [120] in Environmental Bioengineering > Master [120] in Forests and Natural Areas Engineering > Master [120] in Geography : Climatology
Faculty or entity in charge:	AGRO