UCLouvain

lbres2104

2021

IRRIGATION AND DRAINAGE

4.00 credits	22.5 h + 22.5 h	Q2

Teacher(s)	Javaux Mathieu ;
Language :	French
Place of the course	Louvain-la-Neuve
Main themes	- Theory of open channel hydraulics - Classification of flow : uniform and non-uniform flow ; steady state and gradually varied flow - Properties of open channels : energy and momentum principles - Velocity profiles. Specific energy, specific force - Hydrometrology : Venturi, Parshall, gauging, - Uniform flow theory - Gradually varied flow theory. Classification of hydraulic axes. Integration methods - Rapidly varied flow : hydraulic jump, fall, weirs - Types of irrigation systems : gravity, pressure or drip irrigation - Theory of water flow in pipes - Pressure irrigation networks : pumps, pipes, sprinklers; design of a network - Irrigation and salinity.
Learning outcomes	**At the end of this learning unit, the student is able to :** a. Contribution de l'activité au référentiel AA (AA du programme) M1.2 ; M2.2 ; M2.3 ; M2.4 ; M4.5 ; M6.5 ; M6.8 Irrigation: Upon completion of the course and practicals, the student will be able to : - Master the basic knowledge about the water requirements of plants - have the basic knowledge about water intake structures, conveyance, and regulation devices for irrigation water - estimate net irrigation water requirements and propose an irrigation schedule 1 - design an irrigation system under drip, pressure or gravity - Describe the principles underlying the different irrigation techniques - Design an irrigation management scheme and to evaluate its functioning Drainage : At the end of the course and lab, the student will be able to: - Master the theoretical concepts underlying the flow of water into drains and design techniques of drainage; - Assess the value of drainage on the basis of technical, economic and environmental considerations; - Dimension a parallel drainage network using the relevant equations.;
Evaluation methods	The students will be evaluated on the basis of 'continuous' evaluation. The final grade is composed of the weighted average of 6 grades: - Individual progress presentation of the group project (individual) - written report on Aquacrop (by group) - written report on Drainage exercise (by group) - written report on Sprinkler irrigation practical (by group) - written report on the irrigation project (by group) - Multiple choice on the MOOC (indivudual)
Teaching methods	- theory is based on e-learning. A MOOC 'technique d'irrigations' is available, which provides most of the theory through 6 modules. Questions on each module are discussed with the teacher in the course. Theory on driange is taught in class. - Applied project performed by group. Workshops are regularly organized with the technican and theprofessors to help progressins. Every two weeks, joint sessions allow one student of each team to present orally its progress, to hear the work of other teams and get comments and suggestions (feedback) from all the teachers. - practicals on AQUACROP and drainage techniques - roleplay on irrigation water management - excursion : visit of irrigated sites in Belgium
Content	Six online modules allow students to learn the theoretical backgroung on: - M1: why to irrigate and what are consequences of irrigation? - M2: soil-water-plant relations - M3: surface irrigation - M4: soil-water-plant relations

	- M5: micro-irrigation - M6: how to choose and evaluate irrigation systems? Theory on drainage will be taught in class : principles, types of drainage systems, design of drainage systems. Practicals will allow students to (1) use AQUACROP to estimate plant water needs, (2) design a drainage network, and (3) characterize uniformity under sprinkler irrigation. An applied project allows students to apply their knowledge on a real irrigation system and to learn how to combine sensors to estimate irrigation doses and timing. Students will have to program a datalogger which controls the water pump and the sensors and to install a real irrigation system in a field in order to maintain plants alive until he end of the quadrimester.
Inline resources	Moodle
Bibliography	Ouvrage de référence : « Traité d'irrigations », Tiercelin.et al. Syllabus pour la partie drainage (sur Moodle)
Other infos	This course can be given in English.
Faculty or entity in charge	AGRO

Programmes containing this learning unit (UE)

Program title	Acronym	Credits	Prerequisite	Learning outcomes
Master [120] in Agricultural Bioengineering	BIRA2M	4		🔍
Master [120] in Environmental Bioengineering	BIRE2M	4		🔍
Master [120] in Agriculture and Bio-industries	SAIV2M	4		🔍