


5.00 credits

30.0 h + 30.0 h

Q1

Teacher(s)	Soares Frazao Sandra ;
Language :	English > French-friendly
Place of the course	Louvain-la-Neuve
Prerequisites	Fundamental hydraulics or fluid mechanics, as taught in LGCIV1051
Main themes	- Fundamentals in Hydrology - Open-channel flows (steady flows)
Learning outcomes	<p>At the end of this learning unit, the student is able to :</p> <p>Contribution of the course to the program objectives (N°) AA1.1, AA1.2, AA1.3, AA2.1, AA5.2, AA5.3</p> <p>Specific learning outcomes of the course</p> <ul style="list-style-type: none"> • Design of irrigation channels • Design of urban sewers • Calculation of steady flow water profiles in channels • Description and calculation of the effects of local changes in the channel geometry on the flow (narrowing, widening, change in bed slope, presence of bridge piers) <p>1</p> <p>Transversal learning outcomes of the course :</p> <ul style="list-style-type: none"> • Create and use an Excel sheet to solve in a simple and efficient way problems in hydraulic engineering • Basic use of a software for river flow calculations • Summarize the acquired knowledge in order to present on the blackboard a clear and concise answer to a given question • Initiate a general questioning on the use of water resources
Evaluation methods	<p>The final mark for the course comprises the continuous evaluation (40%) and the oral examination during the exam session (60%).</p> <p>Continuous evaluation:</p> <ul style="list-style-type: none"> • Two homeworks evaluated based on a report • One written test about open-channel flow calculations <p>In case of unjustified absence for one of these activities, or if a homework is not delivered, the student will be considered as absent for the evaluation, and will obtain a 0/20 mark for the entire course. The student will have to complete these activities for the second exam session (August-September) to obtain the final mark according to the above mentioned weighting.</p> <p>Oral exam:</p> <ul style="list-style-type: none"> • Preparation of answers on the blackboard, without the lecture notes • Three questions covering the whole course
Teaching methods	<p>Lectures, practical exercises, homeworks and laboratory, all in close link with each other</p> <p>Numerous examples of applications and real cases where the methods developed in the course were applied</p> <p>Use of softwares and creation of Excel calculation sheets</p>
Content	<ul style="list-style-type: none"> • Introduction : purpose of open-channel hydraulics • Hydrology: rain, water cycle, measurement and analysis of discharges, rainfall-discharge relationships (unit hydrograph, rational method, Hauff-Vicari) • Steady open-channel flows: channels, sewers, and rivers. Steady uniform flow: Chezy and Manning equations, optimal trapezoidal section, compound and heterogeneous channels, normal depth calculation in channels and sewers. Gradually varied flows: specific energy, critical depth, critical slope, flow profiles (theory and practical calculations). Flow in natural rivers: pseudo-uniform flow. Rapidly varied flow: hydraulic jump, drawn jump. Flow in non-prismatic geometry: flow between a gate and a reservoir, change in bed slope, change in channel width, presence of bridge piers, Venturi flumes, bottom sill, broad crested weir.

Inline resources	Moodle web site for the course MOOC edX « Hydraulique fluviale 1 : écoulements à surface libre » Podcasts on Youtube
Bibliography	Chow, "Open-channel hydraulics" Lencastre, "Hydraulique générale"
Faculty or entity in charge	GC

Programmes containing this learning unit (UE)				
Program title	Acronym	Credits	Prerequisite	Learning outcomes
Master [120] in Civil Engineering	GCE2M	5		
Master [120] in Architecture and Engineering	ARCH2M	5		