

Water

Hydraulics

AIMS

This module is part of the course unit GCU-S7-HYD (Hydraulics) and contributes to:

Competences in Engineering Science:

- A1- Analyze a real or virtual system (or problem) [level 2]
- A2- Operate a model of a real or virtual system [level 2]
- A3- Implement an experimental approach [level 2]
- A5- Process data [level 2]

Specific competences:

- C17- Designing and sizing networks and structures based on hydrologic and hydraulic approaches for urban planning, buildings and civil engineering infrastructures [level 2]
- C18 - Quantitative analysis of hydrologic processes and to manage networks, structures and urban planning [level 2]
- C19- Environmental assessment of urban water management systems or components [level 1]

Soft skills including humanity and sport:

- B3- Interact with others, work as a team

Allowing the student to work and be evaluated on the following knowledges:

- graphical and computational methods to understand the behavior and to size pressurized pipe networks
- theory and operation of centrifugal pumps
- operation of water supply systems
- open channel flows (designing of river and sewer channels)
- hydraulic jump

Allowing the student to work and be evaluated on the following abilities:

- account for energy losses to size pressurized pipe networks
- sizing a pressurized conduit networks with and without centrifugal pumps and computation of conveyed flow rates
- sizing of open river and sewer channels
- analysis of backwater curves

CONTENT

- centrifugal pumps
- water supply networks
- study of discontinuities (hydraulic jump) and chocks (water hammer)
- open channel flow
- study of flows through weirs and gates
- introduction on Computational Fluid Dynamics and smoothed-particle hydrodynamics: application to the hydrodynamics and solid transport behavior of combined sewer overflow structures, settling basins, open channel junction and bifurcation

BIBLIOGRAPHY

- Carlier, M. [1972]. Hydraulique générale et appliquée, édition Eyrolles.
- Lencastre, A. [1996]. Hydraulique générale. Paris: Eyrolles, 633 p. ISBN 2-212-01894-0.
- Graf, W. H. [2000]. Hydraulique fluviale: écoulement et phénomènes de transport dans les canaux à géométrie simple [Vol. 16]. PPUR presses polytechniques.
- Pernès P. [2003]. Hydraulique unidimensionnelle parties 1 et 2 - Edition Cemagref.
- Hager, W. H. [2010]. Wastewater hydraulics: Theory and practice. Springer Science & Business Media.
- Sinniger, R. O., & Hager, W. H. [1989]. Constructions hydrauliques écoulements stationnaires [Hydraulic structures steady flows]. Presses Polytechniques Romandes: Lausanne

IDENTIFICATION	
CODE :	GCU-4-S1-EC-HG
ECTS :	2.5
HOURS	
Lectures :	10.0 h
Seminars :	18.0 h
Laboratory :	6.0 h
Project :	0.0 h
Teacher-student contact :	34.0 h
Personal work :	26.0 h
Total :	60.0 h
ASSESSMENT METHOD	
lab work report and exam	
TEACHING AIDS	
Lecture documents and slides Document related to lab work description	
TEACHING LANGUAGE	
French	
CONTACT	
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PRE-REQUISITE

3GCU Fluid Mechanics course

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