

Urban Hydraulics

Academic Year:

2019/2020

Course	Bachelor's degree on Civil Engineering				
Scientific Area	Hydraulics and Environment				
ECTS Credits	6	Curriculum Unit code		Year	2
				Semester	4
Type	Compulsory				
Prerequisites					

Contact Hours

Lecture Sessions		Lecture-Practical Sessions	60	Practical and Laboratory Sessions	
Tutorial	15	Placement		Seminar	
Fieldwork		Other		Autonomous Study	87

Responsible	Nelson Jorge Gaudêncio Carriço	Position	Visiting Adjunct Professor
Lecturers		Position	

Learning Outcomes	<p>The aim of the curricular unit is to introduce students to the urban water cycle and its infra-structures, in its quantity and quality aspects, including basic knowledge of water treatment. In this discipline the student will complement the competences acquired in Hydraulics I and II and learn about procedures to solve real problems. Students will be able to perform engineering design of water supply and sewer systems and its interference with the water cycle. Students should develop their competences in work planning and team work. Work planning has a special emphasis in this curricular unit, as milestones are established all through the term. They should be able to research for contents on their own, in this area. They must understand all the possibilities there are for a civil engineer to intervene and when they should interact with other specialists. Students must assure their individual knowledge in the area.</p>
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Syllabus	<ol style="list-style-type: none"> 1. Introduction to the hydrologic cycle and urban water cycle. Hydrology. Catchment basin. Hydrologic cycle and its components. Flood hydrographs. Effects of urbanization on the hydrological cycle. 2. Water supply and sewerage infrastructures. Infrastructure life cycle. Coverage levels in Portugal. Design requirements and criteria. 3. Water supply systems: system components, their location and design principles. Abstraction: types and structures. Transport: economic design. Storage structures. Distribution systems: types, design principles and methods. Distribution systems: types, design principles and methods. Selection of materials. 4. Foul, storm water and combined systems. Fundamentals: types of systems, advantages and drawbacks. Characteristics of wastewater and storm water inflows. Networks design: hydraulic and functional criteria. Selection of materials. 5. Introduction to operation, management and rehabilitation. 6. Introduction to water and wastewater treatment.
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Teaching Methodologies	<p>Theoretical classes were implemented in a perspective of active learning, where students are invited to participate with their opinion, with the interpretation of technical texts or extracts from the media (texts or films). The practical classes are focused in project design, and students are encouraged to bring their projects to class, text, calculations or design plants, for a continuous improvement.</p>
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Evaluation	<p>The evaluation consists of four group assignments and two individual written tests. The group work has a final weight of 60%. We still evaluate the work developed in the classroom context with final weighting of 10% of the final grade. The tests are worth in the set 30%.</p>
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Evidence of the syllabus coherence with the curricular unit's intended learning outcomes

The syllabus assures that all the curricular unit's objectives are met, from the natural water cycle and through all the phases of the urban water cycle. In each topic, the students learn how to design water supply and drainage infra-structures, and the impact of alternative solutions, in terms of the receiving means, of regulatory impositions and future operation and management constraints. All the projects life cycle is studied. Every aspect in design involves previous knowledge from other curricular units in Hydraulics. Basic aspects concerning relations with other specialists are ministered.

Evidence of the teaching methodologies coherence with the curricular unit's intended learning outcomes

The teaching methodology assures that students are evolved their work group and that they are always aware of the milestones. Student's responsibility is promoted with penalization of late deliveries, when every piece of work has a minimum grade and when all the reports are discussed with the teacher. Some necessary elements for design are not provided by the teacher, which obliges the students to look for the information elsewhere. Giving the students technical texts or extracts from the media allows them to perceive that the subjects understudy is way beyond the academic boundaries and allows discussing such concepts in other domains outside Civil Engineering. Self and per evaluation permit a larger acknowledgment of the importance of team work and of individual contribution towards a common goal. Personal learning outcomes are evaluated based on oral discussion of the written reports, individual exams and on oral discussion for higher grades.

Bibliography

WWA (1996). Water transmission and distribution. Principles and practices of water supply operations series.
AWWA (1999). Water quality and treatment systems. 5ª Edição, McGraw Hill.
Brito, R. (2008). Documentação de Saneamento Ambiental, ESTBarreiro/IPS
Butler, D., Davies, J. (2000). Urban Drainage. E&FN Spon.
Lencastre, A., Franco, F.M. (1984). Lições de hidrologia. U.N. L., F.C.T.
Lima, J.L.P., Almeida, J.P.L., Carvalho, M.R.F., Tavares, P.M.V., Marques, J. A. S., Sousa, J. (2000)

Observations