

Course file

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|-------------------------------|-----------------------------|-----------|-------------------------------------|
| Study cycle | MASTER IN CIVIL ENGINEERING | | |
| Course | Urban Hydraulics II | Mandatory | <input checked="" type="checkbox"/> |
| | | Optional | <input type="checkbox"/> |
| Course scientific area | CIVIL ENGINEERING | Category | C |

Course category: B - Basic; C - Core Engineering; E - Specialization; P - Complementary.

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|--------------|---------------|---------|-----|------------|
| Year: 3rd | Semester: 6th | ECTS: 4 | | Total: 108 |
| Contact time | T: | TP: 45 | PL: | S: |
| | | | | OT: |

T - Lectures; TP - Theory and practice; PL - Lab Work; S - Seminar; OT - Tutorial Guidance.

| Course Director | Title | Position |
|----------------------------|------------|-------------------|
| Luís Filipe Almeida Mendes | Licenciado | Professor Adjunto |

Learning objectives (knowledge, skills and competences to be developed by students)

(max. 1000 characters)

To provide to the students the knowledge and skills to design, implement and operate wastewater and stormwater infrastructures for up to 10,000 inhabitants and drainage networks for small and medium size buildings, including construction works and related equipment, namely in the following components:

- O1 - urban wastewater drainage networks;
- O2 - urban stormwater drainage networks;
- O3 - building drainage networks (sewage and stormwater).

Syllabus

(max. 1000 characters)

C1 - Basic concepts:

- a) standards and regulations;
- b) evolution of drainage systems;
- c) fundamental data of wastewater systems;
- d) fundamental data of stormwater systems;

- e) planimetric and altimetric network layouts;
 - f) sewage pipe materials and accessories;
 - g) structural strength of sewage pipes;
- C2 - Urban wastewater networks:
- a) hydraulic design;
 - b) septic control;
 - c) pumping stations;
 - d) wastewater treatment plants for small settlements;
- C3 - Urban stormwater networks:
- a) hydraulic design;
 - b) gutters design;
- C4 - Building's wastewater and stormwater networks:
- a) general design criteria;
 - b) installation and layout, materials and accessories; regulations;
 - c) pipe sizing;
 - d) building's wastewater pumping installations.

Demonstration of the consistency between the syllabus and the course objectives

(max. 1000 characters)

In the scheme below, $C_i \rightarrow O_j$ means the program contents C_i contributes to the objective O_j

C1a to C1c \rightarrow O1 to O3;

C1d \rightarrow O2 and O3;

C1e to C1g \rightarrow O1 and O2;

C2a) to C2d \rightarrow O1;

C3a and C3b \rightarrow O2;

C4a to C4d \rightarrow O3.

Teaching methodology (evaluation included)

(max. 1000 characters)

Classes are used to present and discuss theoretical and practical questions and the regulations that concern the structures included in the course programme, as well as to solve exercises on applying rules of design and sizing. Classes are supplemented with 2 practical project work, accompanied by the teacher and discussed at the end of the semester, as part of the assessment.

Project work is done primarily outside class hours and the students are provided with tutorial support based on weekly availability hours in a fixed schedule, and also through contacts by email .

The evaluation is achieved by performing a theoretical and practical test and includes the classification of the 2 practical project work done by students.

The test is performed on the exam dates and has a relative weight of 2/3 of the final grade, with a minimum of 10 marks (out of 20) . Project work is classified and discussed with students, and weights 1/3 to the final grade, with a minimum of 10 marks .

Demonstration of the consistency between teaching methodology and the course learning objectives

(max. 3000 characters)

The knowledge required for students to acquire the ability to conceive, design and scale the types of infrastructure comprised in the course programme are taught during classes , in which the teacher analyzes and presents the most relevant technical and economic constraints related to the design, sizing and operation of the works involved , including regulatory rules

The exercises performed in class and the discussion of the results obtained allow students to become familiar with the dimensional aspects of the works , in order to be able later to evaluate critically the solutions they find in their work.

The project work (in teams 2-4 students) , provides an opportunity for students to apply their knowledge and develop their creativity and their capacity for analysis and decision-making around the possible alternative solutions. During the preparation of this work students are encouraged to do research on actual cases of works of the same type and to take into account issues related to quality of materials, cost, longevity of works, safety, ease of operation and most appropriate construction techniques.

The final discussion of the work with the teacher allows students to describe and justify the solutions adopted and allows the teacher to highlight the main positive and negative aspects of the work done by students

Main Bibliography

(max. 1000 characters)

RIBEIRO DE SOUSA, E. – Saneamento Ambiental I. IST- S. Hidráulica e Recursos Hídricos. 2001.

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PEDROSO, V. - Manual dos Sistemas Prediais de Distribuição e Drenagem de Águas. LNEC, 2000.

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