



## Course guide

# 2500234 - GEA0234 - Supply and Drainage Networks

**Last modified:** 01/10/2023

**Unit in charge:** Barcelona School of Civil Engineering  
**Teaching unit:** 751 - DECA - Department of Civil and Environmental Engineering.

**Degree:** BACHELOR'S DEGREE IN ENVIRONMENTAL ENGINEERING (Syllabus 2020). (Optional subject).

**Academic year:** 2023    **ECTS Credits:** 6.0    **Languages:** Catalan

### LECTURER

---

**Coordinating lecturer:** JUAN PEDRO MARTÍN VIDE

**Others:** JOSE MIGUEL DIEGUEZ GARCIA, CARLES FERRER BOIX, JUAN PEDRO MARTÍN VIDE, FRANCISCO NUÑEZ GONZÁLEZ, MARTI SANCHEZ JUNY

### DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

---

#### Specific:

14455. Identify the concepts and technical aspects linked to the conduit systems, both in pressure and in free sheet and apply them to the water supply transport networks; pumping systems; unit networks; separative networks; Avenues prevention systems in urban areas and analysis of tools for the recovery of altered river and coastal spaces.

14457. Identify the fundamentals of structure theory, sustainable procedures for construction and dismantling of buildings and civil works; and describe the technology bases of the materials used in construction.

14459. Describe the components and modes of transport and the impact of their externalities on the environment; identify the principles of environmental management of transport systems and sustainable planning of the territory; and introduce the tools for the management and operation of transport systems.

#### Generical:

14440. Identify, formulate and solve problems related to environmental engineering.

14441. Apply the functions of consulting, analysis, design, calculation, project, construction, maintenance, conservation and exploitation of any action in the territory in the field of environmental engineering.

14442. To use in any action in the territory proven methods and accredited technologies, in order to achieve the greatest efficiency respect for the environment and the protection of the safety and health of workers and users.

14443. Apply the necessary legislation during the professional practice of environmental engineering.

14444. Apply business management techniques and labor legislation.

### TEACHING METHODOLOGY

---

The course consists of 4 hours per week of classroom.

Support material in the form of contents and literature in given through ATENEA.

Although most of the sessions will be given in the language indicated, sessions supported by other occasional guest experts may be held in other languages.

## LEARNING OBJECTIVES OF THE SUBJECT

In this subject the characteristics, design, operation and maintenance, and management of the urban networks of supply and drainage (both unitary and separative) and the study of Nature-based solutions for the improvement of the drainage in urban and periurban environments. The characteristics, design and management of urban supply networks, and the characteristics, design and management of urban drainage networks will be described, and we will define the designs of Nature-based solutions for the regulation and control of the water in urban and peri-urban environments.

1. Know the characteristics, management and design of urban networks for the transportation of pressurized water (pipes, pumping systems, valves, etc.).
2. Know the characteristics, management and design of the sewage and rainwater collector systems (unit networks, separative networks, systems prevention of avenues in urban areas, etc)

Supply and Drainage Networks. The characteristics, management and design of urban water supply networks and wastewater and / or stormwater collector networks (unit and separate) will be studied.

## STUDY LOAD

Type	Hours	Percentage
Hours small group	15,0	10.00
Hours medium group	15,0	10.00
Self study	90,0	60.00
Hours large group	30,0	20.00

**Total learning time:** 150 h

## CONTENTS

### Water supply

#### Description:

Water demand. Phases of water supply: intake, transport and distribution  
Pressures in the distribution network. Water tanks  
case of supply in Barcelona: sources and transport  
Advanced calculation of pipes and networks with EPANET  
practical calculation exercise  
Pumps  
irrigation networks, distribution networks  
visit to the control center of the supply network in Barcelona

#### Full-or-part-time: 43h 12m

Theory classes: 12h  
Practical classes: 2h  
Laboratory classes: 4h  
Self study : 25h 12m



## Drainage

### Description:

Urban drainage networks (to be developed)  
Urban drainage improvement by runoff reduction  
the case of the Barcelona sewer network  
Advanced calculation of sewer networks with Hec-Ras

### Full-or-part-time: 50h 24m

Theory classes: 14h  
Practical classes: 2h  
Laboratory classes: 5h  
Self study : 29h 24m

## Hydrographic networks

### Description:

hydrographic networks, classification of rivers, differences between rivers and canals  
fluvial balance: degradation and aggradation, examples  
How to take water: dams, reservoirs, underground water

### Full-or-part-time: 14h 23m

Theory classes: 6h  
Self study : 8h 23m

## Urban floods by rivers

### Description:

Risk of flooding. Flow of an overflowing river. Risk areas  
River engineering against floods. Motes, river training and bridges  
Non-structural measures against floods  
Bridge hydraulics: backwater and scouring  
river engineering calculation exercise  
visit to the Besòs river in Santa Coloma

### Full-or-part-time: 36h

Theory classes: 8h  
Practical classes: 2h  
Laboratory classes: 5h  
Self study : 21h

## GRADING SYSTEM

---

Ordinary Evaluation (continuous)

The qualification of the ordinary evaluation will be the weighted arithmetic mean of three individual practical exercises ('practices'), corresponding to the three parts of the subject, namely Proveïment (Water Supply), Drenatge (Drainage) and Xarxes-Inundacions fluvials (flods and river systems). The grade for each part will come from a 1-hour written exam during class time. Beforehand, the three complete and original exercises must be handed in, which will be graded as failed or approved.

To pass, the note must be greater than or equal to 5.

Re-evaluation

Students who have failed the ordinary assessment and have submitted all three practices (and all three are approved) will be entitled to a reassessment test within the period set in the academic calendar. Students who have already passed it will not be able to take the reassessment test.

The reassessment will be a single oral exam of the entire course. The maximum grade for the reassessment will be five (5.0) and the final grade for the course will be the maximum grade between the continuous assessment and the reassessment exam.

The non-attendance of a student summoned to the re-evaluation test, held in the set period, will not lead to another test at a later date. Extraordinary evaluations will be carried out for those students who, due to accredited force majeure, have not been able to take any of the continuous exams. These tests must be authorized by the corresponding head of studies, at the request of the professor responsible for the subject, and will be carried out within the corresponding school period.

## EXAMINATION RULES.

---

If any of the mentioned tests are not performed, it will be considered as a zero grade. The exams can include test questions, short questions or exercises, except for the reassessment which will be oral.

## BIBLIOGRAPHY

---

### Basic:

- Mays, L.W.; Tung, Y-K.. Hydrosystems Engineering and Management. New York: McGraw.Hill, 1992. ISBN 9780070411463.
- Brière, F.G. Distribution et Collecte des Eaux. Montréal: 'École Polytechnique de Montréal,, 1997. ISBN 9782553006203.
- Heleno Cardoso, A. [et al.]. Hidráulica. Fundamentos e aplicações. Lisboa: IST Press, 2021. ISBN 9789898481818.
- Martín Vide, J.P. Ingeniería de ríos. 2a ed. Barcelona: Edicions UPC, 2006. ISBN 9788483019009.

### Complementary:

- Liria Montañés, J. Proyecto de redes de distribución de agua en poblaciones. Madrid: Colegio de ingenieros de caminos, canales y puertos, 1995. ISBN 9788438000816.
- Cauvin, A.; Didier, G. Distribución de agua en las aglomeraciones. Barcelona: Reverté, 1964.
- Walski, T.M. Analysis of Water Distribution Systems. Malabar: Krieger Publishing Company, 1992. ISBN 9780894646249.
- Arocha Ravelo, S. Abastecimientos de agua. teoría y diseño. Caracas: Vega, 1980. ISBN 9788439980643.
- Metcalf-Eddy. Ingeniería Sanitaria. Redes de alcantarillado y bombeo de aguas residuales. Barcelona: Labor, 1985. ISBN 9788433564221.
- Dolz, J.; Gómez, M.; Martín, J.P. Inundaciones y redes de drenaje urbano. Barcelona: UPC ETSECCP, 1992.