

Course guide

2500034 - HISGECECIV - History of Civil Engineering

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 CIVIL ENGINEERING (Syllabus 2020). (Optional subject).

Academic year: 2023 **ECTS Credits:** 4.5 **Languages:** Catalan

LECTURER

Coordinating lecturer: PERE MACIAS ARAU

Others: PERE MACIAS ARAU, MIGUEL YURY MAYORGA CÁRDENAS, DANIEL RODRIGUEZ ARANDA

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:

- 14406. Ability to analyze the problem of safety and health in construction sites. (Common module to the Civil branch)
- 14410. Knowledge of the typology and calculation bases of prefabricated elements and their application in manufacturing processes. (Specific technology module: Civil Construction)
- 14411. Knowledge about the project, calculation, construction and maintenance of building works in terms of structure, finishes, facilities and own equipment. (Specific technology module: Civil Construction)
- 14413. Capacity for the construction and conservation of roads, as well as for the dimensioning, the project and the elements that make up the basic road equipment. (Specific technology module: Civil Construction)
- 14414. Capacity for the construction and conservation of railway lines with knowledge to apply specific technical regulations and differentiating the characteristics of the mobile material. (Specific technology module: Civil Construction)
- 14415. Ability to apply construction procedures, construction machinery and construction planning techniques. (Specific technology module: Civil Construction)
- 14416. Capacity for the construction of geotechnical works. (Specific technology module: Civil Construction)

TEACHING METHODOLOGY

The course consists of 1.5 hours per week of classroom activity (large size group) and 1.5 hours weekly with half the students (medium size group).

The 1.5 hours in the large size groups are devoted to theoretical lectures, in which the teacher presents the basic concepts and topics of the subject, shows examples and solves exercises.

The 1.5 hours in the medium size groups is devoted to analyse infrastructures with greater interaction with the students. The objective of these land practices is to consolidate the general and specific learning objectives.

Support material in the form of a detailed teaching plan is provided using the virtual campus ATENEA: content, program of learning and assessment activities conducted and literature.

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

Knowledge of civil engineering history and ability to analyze and to value public constructions.

1 Ability to analyze and assess public works in particular, and construction in general and knowledge of the history of civil engineering.

Introduce the student to the knowledge of public works, their evolution in terms of technical and construction-related knowledge and their important roleplayed by public works in the transformation of the land and in the construction of the city. Understand that civil engineering actions, expressed through public works, tend to characterize the way in which the different societies of the western world have interacted with the environment and have modified the land and nature to establish communication systems, water use, energy optimization and alsow the ways in which these societies have set up city infrastructure. Approach the history of public works as transversal knowledge that allows the assessment of regional structures created through engineering from a perspective of functional continuity over time. A dynamic approach will incorporates the historical legacy to the present-day reality. Assess public works in terms of their artistic value, technical legacy, design, and role in landscape creation over time, all of which lends cultural meaning to public works as creations of humankind. This assessment of monumentality, which extends to linear infrastructure, gives meaning to public works as cultural heritage. The understanding of the territory and the city as products of a historical process must allow acquiring a critical and reflective vision of engineering projects and, therefore, incorporate a more integrated vision between public works and land in current project practice.

Learn to value and contextualize the heritage of public works in an action at regional and urban level.

STUDY LOAD

Type	Hours	Percentage
Hours medium group	22,5	20.00
Self study	63,0	56.00
Guided activities	4,5	4.00
Hours large group	22,5	20.00

Total learning time: 112.5 h

CONTENTS

The hydraulic works

Description:

The use and control of water as a major goal. Hydraulic works have contributed decisively to the development of cities and land use planning. Great Roman hydraulic works: water supplies, irrigation, dams, aqueducts. Irrigation systems of the Middle Ages. The legacy of Islamic hydraulics. Hydraulic works during the modern age. Channels and dams. Port works. Hydraulic works in America. Water and contemporary engineering. Foundation of the first school of engineers, 1802. Navigation canals, Suez and Panama. Hygiene, and the birth of urbanism. The urban revolution. The role of engineers in the construction of the city in the nineteenth century. Water supply and sewer. Barcelona subsoil sanitation project, 1893. Regenerationism: watering is governing. Hydrological plans, hydrographic confederations, reservoirs and diversions. Hydroelectricity. Visit and water installation work. Viewing and commenting on reports on water engineering.

Specific objectives:

Know the origin of the great interventions in infrastructures in the Mediterranean civilizations and in Rome. Understand the historical evolution of the scope of hydraulic works. Get to know how water policy has evolved in the 19th and 20th centuries and how it has influenced the growth of the city. Awaken the skills of critical analysis of projects.

Full-or-part-time: 36h

Theory classes: 9h

Practical classes: 6h

Self study : 21h

Railway, territory and city

Description:

The invention of the steam engine. Its application to industries: the industrial revolution. The state of communications in the eighteenth century. The origin of road engineering. Roads and navigation channels. From railways to steam locomotives and the explosion of the railway. The railway and national construction. The late development of the railway in the Iberian Peninsula. The track width controversy. The development of the railway: concessions and concentration of companies. Trains and stations in the formation of the new city. The Cerdà project. The train becomes urban: tram, cable car and metro. The city colonizes its surroundings thanks to the railroad. The railway and electricity, signs of the new century. The subway is already possible. The end of the railway as a hegemonic mode. The destruction of the railway lines. New technologies that are revolutionizing the railway: the bullet train and the TGV. The era of the railroad returns: the high speed, the metropolitan services and the intermodality for merchandize. High speed extension. Bird versus the German model. Railways and combined transport. The return of the tram. Metro, suburbs and regional services. Visit and work train station.

Specific objectives:

Through the history of the railway to discover how road engineering becomes the protagonist of the direction of economic and social progress of the nineteenth century. Learn how cities grow and spread thanks to the railway. Discover the episodes of confrontation between modes of transport and the search for a new balance. And see how this affects twentieth-century cities. Discover the new role of the railway in city systems.

Full-or-part-time: 36h

Theory classes: 12h

Practical classes: 3h

Self study : 21h

Town and car. Evolution of road works from XX ct.

Description:

Urban itinerary and work

Road models and the functionalist city; the introduction of the automobile. Axes, avenues and motorways: meshes and radial models, variants and rounds

Road models, traffic models and urban planning. Road specialization, segregation of functions. The urbanism of the sector and the metropolis.

Urban strategies and projects. The adaptation of the city to the car. Comprehensive design of road infrastructure. Functional stripes.

Paradigm of sustainable mobility and smart-city. Restrictions on the car. The city of pedestrians. Superblocks

Specific objectives:

Knowing how the introduction of the automobile profoundly alters the shape and extent of the city

Know the models applied to traffic and how their influence becomes key to the growth of cities in the twentieth century.

Know the taxonomy of urban roads depending on traffic.

The recovery of public space from a sustainable city vision must be reflected in a new public space project.

Full-or-part-time: 36h

Theory classes: 12h

Practical classes: 3h

Self study : 21h

GRADING SYSTEM

The mark of the course is obtained from the ratings of continuous assessment and the course practice.

A test will be given corresponding to the subject's 3 content modules (from I to III), which will be structured into questions regarding the theoretical concepts and questions aimed at evaluating the practical classes.

In classroom time, three practical exercises will be done based in comparison, discussion and critical approach about subjects and study cases of civil engineering throughout the history.

Finally, an individual assignment will be given out at the end of the subject where students will work about the relationship Urbanism and Infrastructures.

In all these tests the capacity for written communication will be evaluated, along with the ability to connect cases and concepts, as well as the ability to argue points of view.

The final subject note (NT) will be obtained from the scores received from the module test (M), the 3 practical exercises (E1, E2 and E3), the individual assignment (T) according to the following calculation: $NT = 50\%(M) + 10\%(E1) + 10\%(E2) + 10\%(E3) + 20\%(T)$

The evaluation test consist of a part with questions about concepts associated with the learning objectives of the course with regard to knowledge or understanding, and a part with a set of application exercises.

Criteria for re-evaluation qualification and eligibility: students that failed the ordinary evaluation and have regularly attended all evaluation tests will have the opportunity of carrying out a re-evaluation test during the period specified in the academic calendar. Students who have already passed the test or were qualified as non-attending will not be admitted to the re-evaluation test. The maximum mark for the re-evaluation exam will be five over ten (5.0). The non-attendance of a student to the re-evaluation test, in the date specified will not grant access to further re-evaluation tests. Students unable to attend any of the continuous assessment tests due to certifiable force majeure will be ensured extraordinary evaluation periods.

These tests must be authorized by the corresponding Head of Studies, at the request of the professor responsible for the course, and will be carried out within the corresponding academic period.

BIBLIOGRAPHY

Basic:

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- Hernández Muñoz, A. Abastecimiento y distribución de agua. 6a ed. rev. y ampl. Madrid: Garceta, 2015. ISBN 9788416228331.
- Rueda, S. Ecología urbana: Barcelona i la seva regió metropolitana com a referents. Barcelona: Beta, 1995. ISBN 8470913573.
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- Alzola, Pablo de. Historia de las obras públicas en España: las obras públicas en España: estudio histórico. 3a ed. Madrid: Colegio de Ingenieros de Caminos, Canales y Puertos, 2001. ISBN 8438002080.
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- Gehl, J. La humanización del espacio urbano: la vida social entre los edificios. Barcelona: Reverté, 2006. ISBN 8429121099.

Complementary:

- Izquierdo de Bartolomé, R. Cambó y su visión de la política ferroviaria: el inicio de un cambio. Madrid: Colegio de Ingenieros de Caminos, Canales y Puertos : Fundación de los Ferrocarriles Españoles, 2000. ISBN 8438001645.
- Salmerón i Bosch, C. El tren de Sarrià: història del ferrocarril de Sarrià a Barcelona. Barcelona: Terminus, 1988. ISBN 9788440431059.
- González Tascón, I. Fábricas hidráulicas españolas. Madrid: Ministerio de Obras Públicas y Urbanismo, 1987. ISBN 8475062148.
- Latorre, X. Història de l'aigua a Catalunya. 2a ed. Premià de Mar: L'Abecedari, 1998. ISBN 8460527204.
- Macias, P. Via ampla, ment estreta: crònica de 150 anys d'Aïllament ferroviari, 1848-1998.. Barcelona: Términus, 2011. ISBN 9788493945503.
- Capel, H. La morfología de las ciudades. Barcelona: Ediciones del Serbal, 2002-2013. ISBN 8476284632.
- Herce, H.; Magrinyà, F. La ingeniería en la evolución de la urbanística [on line]. Barcelona: Edicions UPC, 2002 [Consultation: 23/03/2021]. Available on: <http://hdl.handle.net/2099.3/36703>. ISBN 848301632X.