Universidad Zaragoza

Academic Year/course: 2021/22

28726 - Construction of Railway Infrastructures

Syllabus Information

Academic Year: 2021/22
Subject: 28726 - Construction of Railway Infrastructures
Faculty / School: 175 - Escuela Universitaria Politécnica de La Almunia
Degree: 423 - Bachelor's Degree in Civil Engineering
ECTS: 6.0
Year: 4 and 3
Semester: Second semester
Subject Type: Compulsory
Module:

1. General information

1.1. Aims of the course

The subject of Railways provides future graduate with the fundamental knowledge to carry out their professional activity in the field of design, construction and maintenance of railway lines. Both the performance of tasks involved in the Civil Engineering Consultancy (Project/study making related to railways, works management and control, technical counselling) and those involved in the Business Contractors Industry (responsible staff for construction, operation and maintenance tasks, etc.) are included.

This is therefore, a specific subject covering one of the traditional fields of action of the Civil Engineer.

These approaches and objectives are in line with the following Sustainable Development Goals (SDGs) of the United Nations 2030 Agenda (https://www.un.org/sustainabledevelopment/es/), in such a way that the acquisition of the course learning outcomes provides training and competence to contribute to their achievement to some degree.

Goal 4: Quality Education

1.2. Context and importance of this course in the degree

The subject of Construction of Railway Infrastructures, is part of the Degree in Civil Engineering offered by the EUPLA, framed within the group of subjects included in the module called Specific Training. It is a third-year course located in the sixth semester and mandatory (OB), with a teaching load of 6 ECTS.

The training offered allows to perform different tasks related to railways such as design, construction and maintenance of the railway taken as a raceway and part of its auxiliary facilities. The subject provides part of the training necessary for the future graduate to adequately carry out professional duties on railways.

1.3. Recommendations to take this course

This course is the first contact the student has with the railways in the degree, so it is not necessary to have completed any other subjects previously, although it is advisable to have knowledge of Surveying, Applied Geology, Geotechnics, Construction Procedures, Mechanics, Electric Technology, CIVIL 3D, CAd.

2. Learning goals

2.1. Competences

E05. Ability for the building and maintenance of railway lines with specific knowledge to apply technical standards and distinguishing characteristics of rolling stock.

G01. Ability for organization and planning.

G02. Ability to solve problems.

G03. Ability to make decisions.

G04. Suitability for oral and written communication in their mother tongue.

G05. Ability for analysis and synthesis.

G06. Ability to manage information.

G07. Ability for teamwork.

G08. Ability for critical thinking.

G09. Ability to work in an interdisciplinary team.

G10. Ability to work in an international context.

G11. Ability to improvise and adapt themselves to face new situations.

G12. Leadership ability.

G13. Positive social attitude towards social and technological innovations.

G14. Reasoning ability, discussion and presentation of ideas.

G15. Communication skills through word and image.

G16. Ability to Search, analyze and select information.

G17. Ability for independent learning.

G18. Acquire knowledge and understanding in a field of study ranging from general secondary education to the forefront.

G19. Apply their knowledge to their work in a professional manner and get competences typically demonstrated through devising and sustaining arguments and solving problems within their field of study.

G20. Ability to gather and interpret relevant data (usually within their field of study) to make informed judgments that include reflection on relevant social, scientific or ethical issues.

G21. Transmit information, ideas, problems and solutions to both specialist and non-specialist audiences.

G22. Develop those skills needed to undertake further studies with a high degree of autonomy.

G23. Learn and understand the respect to fundamental rights, equal opportunities between men and women, universal accessibility for people with disabilities, and respect for the values of the culture of peace and democratic values.

G24. Foster entrepreneurship.

G25. Knowledge on information and communication technology. Context and meaning of the subject in the degree

2.2. Learning goals

1. Learn and understand the basic concepts and terminology used in the design of railway lines.

2. Learn the terminology and ability to project a railway and part of its auxiliary facilities.

3. Learn, understand and use the different concepts comprising the infrastructure and superstructure of railways as well as the so-called rolling stock.

4. Learn and understand the activities of maintenance and operation of railway lines.

2.3. Importance of learning goals

This course has a strong engineering orientation, ie, it offers training with immediate application and content development in the labor and professional market. Through the achievement of relevant learning outcomes the required ability for understanding the operation of railways is obtained.

3. Assessment (1st and 2nd call)

3.1. Assessment tasks (description of tasks, marking system and assessment criteria)

Due to the characteristics of the syllabus of this subject with two clearly differentiated blocks, the evaluation will be carried out independently for each of the didactic units, UD I and UD II.
Two forms of evaluation will be followed: a continuous one with two exams carried out throughout the semester and a final global evaluation, the latter with two calls (June and September). These evaluations (continuous and final global) are not exclusive, being able to opt for the second in case of not having passed the subject throughout the exams programmed during the course of the semester.

A student who passes the two continuous assessment exams will not have to take the final global exam.
Those students who do not reach this condition will have to sit the final exam of the two teaching units, even if they have passed one of them through continuous evaluation (regardless of the grade obtained).
The final grade to be recorded in the minutes, in case of being "suitable" in both exams, will be the result of

averaging the qualifications obtained in both.
In both modalities of qualification, continuous and global final, the student must deliver the assignments that have been entrusted during the course. Failure to deliver any of these works will mean the loss of the right to correct the exam.

The works will be carried out in teams of 2 students expressly designated by the teacher and their content, definition and delivery conditions will be published through the Moodle platform.

A system of **continuous assessment**,

• Participation in Class 10%

• Mandatory Projects / work 10%

• Final Assessment Test 80%

- Ev I (40%):

Theory	65%
Practice	35%

- Ev II (40%):

Theory	60%
Practice	40%

In global assessment test the following points the approximate weights of the evaluation process are shown:

• Projects / Mandatory tasks 10%

• Final Assessment Test 90%

No grades of an academic year will be valid for the next.

4. Methodology, learning tasks, syllabus and resources

4.1. Methodological overview

The methodology followed in this course is oriented towards the achievement of the learning objectives. A wide range of teaching and learning tasks are implemented, such as theory sessions, problem-solving, and autonomous work and study.

The teaching methodology is based on a strong interaction teacher/student. This interaction is made a reality by a division of work and responsibilities between students and teachers. However, we have to be aware that to some extent the students can decide their pace of learning according to their needs and availability, following the guidelines set by the teacher.

"If due to health reasons the in-person teaching-learning process is not possible, it shall be carried out telematically."

4.2. Learning tasks

This course is organized as follows:

- **Lectures.** theoretical concepts of the course will be explained and practical examples will be developed.
- **Problem-solving**: Students will develop examples and solve problems or case studies concerning the theoretical concepts studied.
- **Autonomous work and study**. Reinforcement activities through a virtual education portal (Moodle) several activities that reinforce the basic contents of the course will be conducted. These activities will be customized and monitored.

This course consists of 6 ECTS, which represent 150 hours of student work on the course during the term. 40% of this work (60 h.) will take place in the classroom, and the rest will be autonomous. A term consists of 15 teaching weeks. Each student should devote 10 weekly hours to the study of the course.

4.3. Syllabus

This course will address the following topics:

Theory contents:

SECTION I: Railway Transport.

- UNIT 1: HISTORY AND DEVELOPMENT OF THE RAILWAY
- UNIT 2: THE RAILWAY
- UNIT 3: ESSENTIAL FEATURES OF THE RAILWAY TRANSPORT

- UNIT 4: GENERAL CONSIDERATIONS ABOUT THE TRACK

SECTION II: Design and maintenance of railway works.

- UNIT 5: THE RAIL.
- UNIT 6: SLEEPERS.
- UNIT 7: SMALL TRACK MATERIAL.
- UNIT 8: THE PLATFORM.
- UNIT 9: TRACK SYSTEMS.
- UNIT 10: JOINTLESS TRACK.
- UNIT 11: SWITCHES AND CROSSINGS

SECTION III: MOBILE MATERIAL, ELECTRIFICATION, SIGNALLING AND INSPECTIONS

- UNIT 12: TRACK MACHINERY
- UNIT 13: RAILWAY ELECTRIFICATION
- UNIT 14: SIGNALS
- UNIT 15: INSPECTIONS

SECTION IV: SIZING

- UNIT 16: RAILWAY ROLLING
- UNIT 17: TRACK GEOMETRY
- UNIT 18: HIGH SPEED
- UNIT 19: CONSTRUCTION OF RAILWAY INFRASTRUCTURE

Practical contents:

Each unit discussed in the previous section, has associated practices, whether through practical cases in the classroom or laboratory, interpretation and commentary on readings associated with the issues and/or work leading to the achievement of results and their analysis and interpretation.

As unit are developed, the above-mentioned practice tasks will be suggested either in class or through the ADD (Moodle) platform.

4.4. Course planning and calendar

The contents to be taught in every teaching week are shown below. These correspond to the topics presented in the course content. (They may be subject to change to be adapted to unforeseen changes in the school calendar).

- Week 1: SECTION I.
- Week 2: SECTION I
- Week 3: SECTION II
- Week 4: SECTION II
- Week 5: SECTION II.
- Week 6: SECTION III.
- Week 7: SECTION III.
- Week 8: SECTION III.
- Week 9: SECTION III.
- Week 10: SECTION IV.
- Week 11: SECTION IV.
- Week 12: SECTION IV.
- Week 13: SECTION IV.
- Week 14: SECTION IV.
- Week 15: ASSESSMENT

The dates of the final exams will be published in http://www.eupla.es/secretaria/academica/examenes.html. The final schedule of the academic year can be seen on the school web http://www.eupla.es.

Class schedules and the distribution of group practices will be transmitted to students by the teacher at the beginning of the academic year and will be published on the Moodle platform as well as on the university website (http://www.eupla.es).

Within the final tests, there will be obligatory exams for all the students. These dates will be published on the website of the university (www.eupla.es) at the beginning of the academic year.

The dates of other activities (such as assessing tests, seminars, compulsory practices, task deadlines ...) will be

published at the beginning of the academic year, reported by the teacher to the students the first school day, and they will also be published through the Moodle platform.

4.5. Bibliography and recommended resources

http://psfunizar10.unizar.es/br13/egAsignaturas.php?codigo=28726