

## 28765 - Construction of Railway Infrastructures

### Información del Plan Docente

<b>Academic Year</b>	2017/18
<b>Faculty / School</b>	175 - Escuela Universitaria Politécnica de La Almunia
<b>Degree</b>	423 - Bachelor's Degree in Civil Engineering
<b>ECTS</b>	6.0
<b>Year</b>	4
<b>Semester</b>	Second semester
<b>Subject Type</b>	Optional
<b>Module</b>	---

### **1.General information**

#### **1.1.Introduction**

It is obvious that the Civil Engineer, although not specialized in the design or implementation of railway networks must learn about the different structural forms and their corresponding functions.

The teaching of this subject is the responsibility of the teacher of the Department of Law, Urban and Regional Planning of the EUPLA, Ms. Rosa Vicente Vas.

#### **1.2.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.

#### **1.3.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.

#### **1.4.Activities and key dates**

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 ([www.eupla.es](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](http://www.eupla.es)) at the beginning of the academic year.

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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.

### **2.Learning goals**

#### **2.1.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

#### **2.2.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.Aims of the course and competences**

#### **3.1.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.

#### **3.2.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.

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- 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

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values.

G24. Foster entrepreneurship.

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

### **4. Assessment (1st and 2nd call)**

#### **4.1. Assessment tasks (description of tasks, marking system and assessment criteria)**

The assessment process will include two types of action:

- a. A system of continuous assessment, which will take place throughout the learning period.
- b. A global assessment test that reflects the achievement of learning outcomes at the end of the teaching period.

##### **a. Continuous assessment system.**

These evaluative processes will be made through:

- Direct observation of the student to know their attitude towards the subject and the work that is required (attention in the lectures, the carrying out of tasks assigned to them, solving issues and problems, active participation in the classroom, etc.).
- Direct observation of the skills in everyday work.
- Checking of their progress in the conceptual field (class questions, comments in the classroom, exams, etc.).
- Periodical oral and / or written tests to assess the degree of acquired knowledge and discourse management skills which, at this level, should be adequate.

The following points summarize the approximate rating of the parts mentioned in the assessment process.

- \* Participation in Class 5%
- \* Mandatory Projects / work 10%
- \* Written tests 5%
- \* Final Assessment Test 80%

The participations in theoretical and / or practical classes will be accepted both in the classroom and virtual (in the virtual campus, forums or other means accepted in the subject).

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All students that cannot reach the minimum goals required in practical tests, exams or suggested academic work in the subject, automatically switch to the non-continuous assessment model.

The student will not pass the subject until he has handed in the project commissioned by the teacher, being September the deadline for that.

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

Attendance to classroom activities must be at least 80%, students who do not meet this requirement will be out of the continuous assessment.

### b. Global Final Assessment Test.

The global assessment test will consist of the following group of activities:

- **Exercises, theoretical issues and suggested works** : The teacher proposes exercises, problems, case studies, theoretical issues, etc. to be solved individually, which must be handed in before a suggested date.

- **Written exam** : Due to the type of course, it will consist of theoretical and practical problems and tests. All that with reasonable resolution time. The most suitable type of test consists of the solving exercises with theoretical and / or practical application of similar characteristics to the ones solved along the year.

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

\* Projects / Mandatory tasks 20%

\* Final Assessment Test 80%

The student will not pass the subject until he has handed in the project commissioned by the teacher, being September the deadline for that.

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

## 5. Methodology, learning tasks, syllabus and resources

### 5.1. Methodological overview

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.

### 5.2. Learning tasks

1. Classroom activities:

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- a. Theoretical classes: theoretical concepts of the subject will be explained and practical examples will be developed.
  - b. Monitored practical work, problem lessons: Students will develop examples and solve problems or case studies concerning the theoretical concepts studied.
2. Monitored Autonomous activities: These activities will be monitored by teachers of the subject. The student will be allowed to perform these activities in the institution, under the supervision of a teacher of the department.
3. Reinforcement activities: Through a virtual education portal (Moodle) several activities that reinforce the basic contents of the subject will be conducted. These activities will be customized and monitored.

The subject consists of 6 ECTS, which represent 150 hours of student work on the subject during the semester. 40% of this work (60 h.) will take place in the classroom, and the rest will be autonomous. A semester consists of 15 teaching weeks.

To schedule the timing the reaching week is used as a reference. In that period of time the student must devote 10 hours to the study of the subject.

### 5.3.Syllabus

#### **TEACHING UNIT I: Railway Transport.**

CHAPTER 1: HISTORY AND DEVELOPMENT OF THE RAILWAY

CHAPTER 2: THE RAILWAY

CHAPTER 3: ESSENTIAL FEATURES OF THE RAILWAY TRANSPORT

CHAPTER 4: GENERAL CONSIDERATIONS ABOUT THE TRACK

#### **TEACHING UNIT II: Design and maintenance of railway works.**

CHAPTER 5: THE RAIL.

CHAPTER 6: SLEEPERS.

CHAPTER 7: SMALL TRACK MATERIAL.

CHAPTER 8: THE PLATFORM.

CHAPTER 9: TRACK SYSTEMS.

CHAPTER 10: JOINTLESS TRACK.

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CHAPTER 11: SWITCHES AND CROSSINGS

### **TEACHING UNIT III: MOBILE MATERIAL, ELECTRIFICATION, SIGNALLING AND INSPECTIONS**

CHAPTER 12: TRACK MACHINERY

CHAPTER 13: RAILWAY ELECTRIFICATION

CHAPTER 14: SIGNALS

CHAPTER 15: INSPECTIONS

### **TEACHING UNIT IV: SIZING**

CHAPTER 16: RAILWAY ROLLING

CHAPTER 17: TRACK GEOMETRY

CHAPTER 18: HIGH SPEED

CHAPTER 19: CONSTRUCTION OF RAILWAY INFRASTRUCTURE

### **5.4.Course planning and calendar**

Next, the contents to be taught in every teaching week are shown. 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: TEACHING UNIT I.

Week 2 TEACHING UNIT I

Week 3: TEACHING UNIT II

Week 4: TEACHING UNIT II

Week 5: TEACHING UNIT II.

Week 6: TEACHING UNIT III.

Week 7: TEACHING UNIT III.

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Week 8: TEACHING UNIT III.

Week 9: TEACHING UNIT III.

Week 10: TEACHING UNIT IV.

Week 11: TEACHING UNIT IV.

Week 12: TEACHING UNIT IV.

Week 13: TEACHING UNIT IV.

Week 14: TEACHING UNIT 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>.

### 5.5. Bibliography and recommended resources

- Losada, Manuel.. Curso de ferrocarriles./Manuel Losada. - 1ª edc Madrid] : [Universidad Politécnica de Madrid, E.T.S. Ingenieros de Caminos, Canales y Puertos], 1991. [Cuadernos nº I: El ferrocarril y el transporte. -- II: Estructura de la vía. -- III: Mecánica de la vía. -- IV: Geometría y calidad de vida. -- V: Explotación técnica.]
- Losada, Manuel. Curso de ferrocarriles. Cuaderno II, Estructura de la vía / Manuel Losada. - 1 edc [Madrid] : [Universidad Politécnica de Madrid, Cátedra de Ferrocarriles], [1987 [Cuaderno II, Estructura de la vía]
- Losada, Manuel. Curso de ferrocarriles. Cuaderno III, Mecánica de la vía /Manuel Losada, J. Quereda. - 1 edc Madrid : Colegio de INgenieros de Caminos, Canales y Puertos, Servicio de Publicaciones, 2001
- Losada, Manuel. Curso de ferrocarriles. Cuaderno IV, Geometría y calidad de la vía / Manuel Losada. - 1 edc Madrid] : [Universidad Politécnica de Madrid, Cátedra de Ferrocarriles], 1989
- González Fernández, Francisco Javier.. Ingeniería ferroviaria / Francisco Javier González Fernández; Julio Fuentes Losa. 1edc Madrid : Universidad Nacional de Educación a Distancia, 2010.
- Álvarez Stein, Alejandro. Técnica ferroviaria / Alejandro Álvarez Stein. - 1ª edc Madrid : Tébar, 2012
- Villaronte Fernández-Villa, Juan Antonio.. Tecnología e ingeniería ferroviaria : tecnología de la vía / Juan Antonio Villaronte . - 4ª ed. Collado Villalba (Madrid) : Delta Publicaciones, 2012.
- Villaronte Fernández-Villa, Juan Antonio. Ingeniería y tecnología ferroviaria :procedimientos constructivos e instalaciones / Juan Antonio Villaronte Fernández-Villa. - 3ª ed Collado Villalba (Madrid) : Delta, 2011

• Online Resources:

[www.tecnorail.com](http://www.tecnorail.com)

[www.adif.es](http://www.adif.es)