

## 30052 - Railways and Other Guided Vehicles

### Información del Plan Docente

<b>Academic Year</b>	2016/17
<b>Academic center</b>	110 - Escuela de Ingeniería y Arquitectura
<b>Degree</b>	436 - Bachelor's Degree in Industrial Engineering Technology
<b>ECTS</b>	6.0
<b>Course</b>	4
<b>Period</b>	First semester
<b>Subject Type</b>	Optional
<b>Module</b>	---

### **1.Basic info**

#### **1.1.Recommendations to take this course**

#### **1.2.Activities and key dates for the course**

### **2.Initiation**

#### **2.1.Learning outcomes that define the subject**

#### **2.2.Introduction**

### **3.Context and competences**

#### **3.1.Goals**

#### **3.2.Context and meaning of the subject in the degree**

#### **3.3.Competences**

#### **3.4.Importance of learning outcomes**

### **4.Evaluation**

### **5.Activities and resources**

#### **5.1.General methodological presentation**

The learning process that is designed for this subject is based on the following:

1. Lecture and examples of practical application.
2. The development of practices done by students, so that they can observe practical applications during lectures.
3. Development of a group project. To consolidate the knowledge acquired, the students will develop a practical project which must be exposed and defended in class.
4. Talks by professionals and visits to railway facilities.

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### 5.2.Learning activities

The program that the student is offered to help you achieve the expected results includes the following activities ...

Lecture and examples of practical application. The contents developed are related with the following subjects:

- Railway Facilities (in track, electrification, signaling and blocking, communication).
- Rolling stock (traction material, vehicle types, elements and components of traction systems, electronic control systems functions in vehicles, train units, passengers and freight, and maintenance).
- Cross-cutting themes: Interoperability and sustainability in rail transport, mining and railway policies.

Laboratory practices. For the realization of the practices are available the following laboratories:  
Lab computers to perform calculations and simulations.

Development of a group project, whereby the student show and will value the knowledge acquired.

Professional lectures and visits to railway facilities, will be scheduled, thus providing students an overview of the opportunities for professional development within the rail sector

### 5.3.Program

The program content of the subject is as follows:

- 1- HISTORICAL INTRODUCTION
  - 1.1 ORIGINS OF RAILWAY
  - 1.2 DIESEL TRACTION
  - 1.3 ELECTRICAL TRACTION
- 2- INTRODUCTION
  - 2.1 TYPES OF TRACTION
  - 2.2 EQUATION OF MOTION
  - 2.3 RAIL LOCOMOTIVES
  - 2.4 INFRASTRUCTURE
- 3- TYPES OF TRACTION
  - 3.1 DIESEL TRACTION
  - 3.2 TRACTION BY TURBINE ENGINE
  - 3.3 TRACTION ELECTRIC
    - 3.3.1 DC
    - 3.3.2 With single phase alternating current
    - 3.3.3 With three-phase AC
    - 3.3.4 Comparison diesel electric front
- 4- THEORY OF MOVEMENT
  - 4.1 TRACTION
  - 4.2 STRENGTH, EFFORTS AND VIRTUAL LENGTHS
    - 4.2.1 STRENGTH
    - 4.2.2 EFFORTS
    - 4.2.3 VIRTUAL LENGTHS
  - 4.3 ADHERENCE
    - 4.3.1 DEFINITIONS
    - 4.3.2 FACTORS INFLUENCING ADHERENCE
  - 4.4 BRAKING
    - 4.4.1 TRAIN BRAKING
    - 4.4.2 BRAKE SYSTEMS
  - 4.5 AERODYNAMICS
  - 4.6 TRANSMISSION
- 5- RAIL LOCOMOTIVES

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- 5.1 ELECTRICAL PART
- 5.2 MECHANICAL PART
- 6 INFRASTRUCTURE
  - 6.1 PATHWAY
    - 6.1.1 PARTS OF THE ROAD
    - 6.1.2 TURNOUTS: TURNOUTS AND CROSSINGS
    - 6.1.3 THE SLAB TRACK
  - 6.2 SIGNALLING
    - 6.2.1 SIGNALLING SUBSYSTEMS
    - 6.2.2 INTERLOCKS
    - 6.2.3 SAFETY SYSTEMS FOR SIGNALING AND LINE CONTROL
  - 6.3. FOOD
    - 6.3.1 CONTACT LINE
    - 6.3.2 CIRCUIT RETURN
    - 6.3.3 INFLUENCE OF THE CONTACT LINE AND THE RETURN CIRCUIT
  - 6.4 SUB STATIONS
    - 6.4.1 TYPES OF SUBSTATIONS
    - 6.4.2 SUBSTATIONS IN SPAIN
  - 6.5. STATIONSS
    - 6.5.1 TYPES OF STATIONS
    - 6.5.2 DRAFT STATION
- 7 OTHER VEHICLES DRIVEN
  - 7.1 THE TRAM
  - 7.2 METRO
  - 7.3 HIGH SPEED TRAINS

### 5.4.Planning and scheduling

Scheduling sessions and presentation of works.

The schedule of the course for classroom sessions and practical lab classes are fixed by the EINA.

Complementary activities, such as lectures and technical visits, which can be done during the course will be announced in advance.

### 5.5.Bibliography and recommended resources

Students could find additional information and resources in the library, for example clicking on <http://biblioteca.unizar.es/como-encontrar/bibliografia-recomendada>