Course guide
340710 - TEFE - Railway Technologies

Last modified: 25/06/2024

Unit in charge: Vilanova i la Geltrú School of Engineering
Teaching unit: 709 - DEE - Department of Electrical Engineering.

Degree: BACHELOR'S DEGREE IN ELECTRICAL ENGINEERING (Syllabus 2009). (Optional subject).
BACHELOR'S DEGREE IN INDUSTRIAL DESIGN AND PRODUCT DEVELOPMENT ENGINEERING (Syllabus 2009). (Optional subject).
BACHELOR'S DEGREE IN INDUSTRIAL ELECTRONICS AND AUTOMATIC CONTROL ENGINEERING (Syllabus 2009). (Optional subject).
BACHELOR'S DEGREE IN MECHANICAL ENGINEERING (Syllabus 2009). (Optional subject).
BACHELOR'S DEGREE IN INFORMATICS ENGINEERING (Syllabus 2018). (Optional subject).

Academic year: 2024 **ECTS Credits:** 6.0 **Languages:** English

LECTURER

Coordinating lecturer: Lluís Monjo Mur

Others:

PRIOR SKILLS

It is not necessary any previous knowledge.

REQUIREMENTS

There is no previous requeriments.

TEACHING METHODOLOGY

The subject is based on active methodologies and challenges during the semester. There will bealso expositive sessions.

LEARNING OBJECTIVES OF THE SUBJECT

Railway systems are a key element in the mobility of people and goods. Furthermore, they become the best example of electrified and efficient transportation in the energy transition. The subject's objective is to know the basic concepts that allow this system to function, from its regulation and organization to the different technological systems (civil, electromechanical, communications, etc.) that enable mobility and their management methods.

STUDY LOAD

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

Total learning time: 150 h

CONTENTS

Railways system introduction

Description:
1. The railway as a system. Basic concepts, subsystems and interrelationships.
2. Organization of the railway system
3. The railway in the world.

Full-or-part-time: 14h
Theory classes: 4h
Laboratory classes: 3h
Self study : 7h

Services types

Description:
1. Local, regional, metro and tramways.
2. High speed and long distance services.
3. Transport of goods.

Full-or-part-time: 20h
Theory classes: 4h
Guided activities: 6h
Self study : 10h

Civil work

Description:
1. Platform and track
2. Stations
3. Exchangers
4. Bridges, tunnels and gauges
5. Width changers

Full-or-part-time: 12h
Theory classes: 4h
Laboratory classes: 2h
Self study : 6h

Railway traction

Description:
1. Physical principles of traction
2. Mechanical transmission
3. Electric traction motors
4. Diesel-electric traction motors

Full-or-part-time: 32h
Theory classes: 4h
Laboratory classes: 6h
Guided activities: 6h
Self study : 16h

Energy systems

Description:
1. Energy and transport
2. Energy needed to move a train
3. Technologies for braking
4. Ecodriving
5. Catenary and substations

Full-or-part-time: 32h
Theory classes: 6h
Laboratory classes: 4h
Guided activities: 6h
Self study : 16h

Comunicactions and protection technologies

Description:
1. Security and locking systems
2. ATP, ATO and ATC systems
3. Train-land communications

Full-or-part-time: 16h
Theory classes: 4h
Laboratory classes: 4h
Self study : 8h

Line management

Description:
1. Technical exploitation of the railway
2. Railway schedule

Full-or-part-time: 24h
Theory classes: 4h
Laboratory classes: 4h
Guided activities: 4h
Self study : 12h

GRADING SYSTEM

Challenges (60%)
Work (40%)

BIBLIOGRAPHY

Basic:
- Fuentes Losa, Julio; González Fernández, Francisco Javier. Ingeniería ferroviaria . Segunda edición. Madrid : Universidad Nacional de Educación a Distancia, 2010. ISBN 9788436260748.
- Ihme, Joachim. Rail vehicle technology . ©2022. ISBN 365836968X.
- Fraile Mora, Jesús. Máquinas eléctricas . 2ª ed. Madrid : Servicio de Publicaciones. Colegio de Ingenieros de Caminos, Canales y Puertos, 1993. ISBN 9788474931433.
- Guerrieri, Marco. Fundamentals of railway design . 1st ed. 2023. ©2023. ISBN 9783031240294.

Complementary:

- JabÅ□oÅ□ski, Adam ; JabÅ□oÅ□ski, Marek; JabÅ□oÅ□ski, Marek. Digital Safety in Railway Transport [on line]. Springer, Available on: https://discovery.upc.edu/permalink/34CSUC_UPC/19srfpi/cdi_askewsholts_vlebooks_9783030961336.
- Friedrich Kießling. Contact Lines for Electric Railways: Planning, Design, Implementation, Maintenance. 2018 . publicis,