

Course guide

240648 - 240648 - Train, Transport and Technology. From Steam to High Speed

Last modified: 16/05/2023

Unit in charge: Barcelona School of Industrial Engineering
Teaching unit: 749 - MAT - Department of Mathematics.

Degree: BACHELOR'S DEGREE IN INDUSTRIAL TECHNOLOGY ENGINEERING (Syllabus 2010). (Optional subject).

Academic year: 2023 **ECTS Credits:** 3.0 **Languages:** Catalan

LECTURER

Coordinating lecturer: Carles Puig Pla

Others:

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Transversal:

1. TEAMWORK. Being able to work as a team player, either as a member or as a leader. Contributing to projects pragmatically and responsibly, by reaching commitments in accordance to the resources that are available.
2. EFFICIENT ORAL AND WRITTEN COMMUNICATION. Communicating verbally and in writing about learning outcomes, thought-building and decision-making. Taking part in debates about issues related to the own field of specialization.

TEACHING METHODOLOGY

Presentation sessions of different topics, supplemented by the use of ICT and individual resources
Cooperative learning based on case studies; oral presentations and delivering papers by students
Case studies preparation, based on library resources and web resources

LEARNING OBJECTIVES OF THE SUBJECT

- 1. To explain the main contributions of the pioneers of steam engines in Europe and Catalonia.
- 2. To identify major technological progress in railway locomotives at different times and historical contexts.
- 3. To describe the main features of the history of the construction of the railway network in Spain and Catalonia.
- 4. To recognize the most significant changes that have contributed to the development of rail transport from the nineteenth to the twenty-first century.
- 5. To explain the most important characteristics of high-speed and magnetic levitation railway.
- 6. To use library resources and the Internet to find study materials related to the history of transportation and railway technology.

STUDY LOAD

Type	Hours	Percentage
Hours medium group	30,0	40.00
Self study	45,0	60.00

Total learning time: 75 h



CONTENTS

Item 1. - The steam engine

Description:

Steam energy. Precedents. Newcomen steam engine. The contributions of James Watt: condenser, converting linear motion into rotary, double effect steam machine, the regulator. Boulton & Watt machines. First steam engine in Catalonia in the nineteenth century: Francesc Santponç and Barcelona's School of Mechanics.

Specific objectives:

The student achieves objectives 1 and 6

Related activities:

Apart from the theoretical introduction classes and group activities in class, see below.

Related competencies :

04 COE. EFFICIENT ORAL AND WRITTEN COMMUNICATION. Communicating verbally and in writing about learning outcomes, thought-building and decision-making. Taking part in debates about issues related to the own field of specialization.

Full-or-part-time: 15h

Theory classes: 6h

Self study : 9h

Item 2. The advent of the railway in Europe and America

Description:

First locomotive Richard Trevithick effective. The railway between Stockton and Darlington. Contributions of George Stephenson: the contest and Rainhill Rocket locomotive. The beginnings of rail transport: line Manchester - Liverpool. Marc Seguin and the introduction of the railway in France. The arrival of the railway in Germany: the Adler. The introduction of the railroad in the United States. American method of locomotive design characteristics; the Bogi.

Specific objectives:

that students achieve objectives 2 and 6

Related activities:

Apart from the theoretical introduction classes and group activities in class, see below.

Related competencies :

05 TEQ. TEAMWORK. Being able to work as a team player, either as a member or as a leader. Contributing to projects pragmatically and responsibly, by reaching commitments in accordance to the resources that are available.

Full-or-part-time: 15h

Theory classes: 6h

Self study : 9h



Item 3. Railway network in Spain

Description:

The first Latin American Railroad (Havana-Guines). The American engineer Alfred Cruger; incompatibilities of American and English technologies. The first Peninsular Railway: Barcelona-Mataró (1848) by Miquel Badia. The question of the width of the road. First railway concessions in Spain. First law of the railway Push Progressive Biennium: general law of railroads (1855). The Spanish railway network up to the Establishment of the RENFE (1941).

Specific objectives:

that students achieve their goals 3 and 6

Related activities:

Apart from the theoretical introduction classes and group activities in class, see below.

Related competencies :

04 COE. EFFICIENT ORAL AND WRITTEN COMMUNICATION. Communicating verbally and in writing about learning outcomes, thought-building and decision-making. Taking part in debates about issues related to the own field of specialization.
05 TEQ. TEAMWORK. Being able to work as a team player, either as a member or as a leader. Contributing to projects pragmatically and responsibly, by reaching commitments in accordance to the resources that are available.

Full-or-part-time: 15h

Theory classes: 6h

Self study : 9h

Item 4.'s Construction of the railway network in Catalonia

Description:

The construction of the railway network in Catalonia. Extension of the line from Mataró to Arenys. From Barcelona to Granollers and successive extensions. From Barcelona to Molins de Rei and Tarragona. Fusion and concentration of railway lines. The Maquinista Terrestre y Marítima Company. The difficult expansion to France, the line of Paris (1878). Electrification of Sarrià Railway. The Mancomunitat and the Network of Secondary Railroads; narrow-gauge railways and rack railway.
Item 4.'s Construction of the railway network in Catalonia

Specific objectives:

that students achieve their goals 3 and 6

Related activities:

Apart from the theoretical introduction classes and group activities in class, see below.

Related competencies :

04 COE. EFFICIENT ORAL AND WRITTEN COMMUNICATION. Communicating verbally and in writing about learning outcomes, thought-building and decision-making. Taking part in debates about issues related to the own field of specialization.
05 TEQ. TEAMWORK. Being able to work as a team player, either as a member or as a leader. Contributing to projects pragmatically and responsibly, by reaching commitments in accordance to the resources that are available.

Full-or-part-time: 15h

Theory classes: 6h

Self study : 9h



Item 5. Technological development of high speed train

Description:

Urban Railways: train (metro). The first London Underground (1863). Esteve Terrades and the Transversal Metropolitan Railway in Barcelona (1926). Electric propulsion railway: trams. The tram in Barcelona. The "automotors" or self-propelled railway (diesel engine, electric engine or diesel-electric engine). The train today: the need for new rail infrastructure. High-speed trains (TGV, AVE, ICE, ETR,...). The Eurotunnel. The Shinkansen in Japan. The Maglev, magnetic levitation train. The transport by train: a sustainable transport?

Specific objectives:

that students achieve goals 4, 5 and 6

Related activities:

Apart from the theoretical introduction classes and group activities in class, see below.

Related competencies :

04 COE. EFFICIENT ORAL AND WRITTEN COMMUNICATION. Communicating verbally and in writing about learning outcomes, thought-building and decision-making. Taking part in debates about issues related to the own field of specialization.

05 TEQ. TEAMWORK. Being able to work as a team player, either as a member or as a leader. Contributing to projects pragmatically and responsibly, by reaching commitments in accordance to the resources that are available.

Full-or-part-time: 15h

Theory classes: 6h

Self study : 9h

ACTIVITIES

name english

Description:

The students form groups and prepare a work, assigned by teacher, related to the course content and they will expose it in the classroom.

Specific objectives:

To achieve good oral and written communication as well as good teamwork and to evaluate objective 6

Material:

Library materials and Web resources

Delivery:

Before finishing classes during the exhibition in accordance with the schedule of exhibitions set (according to the number of groups)

Related competencies :

04 COE. EFFICIENT ORAL AND WRITTEN COMMUNICATION. Communicating verbally and in writing about learning outcomes, thought-building and decision-making. Taking part in debates about issues related to the own field of specialization.

05 TEQ. TEAMWORK. Being able to work as a team player, either as a member or as a leader. Contributing to projects pragmatically and responsibly, by reaching commitments in accordance to the resources that are available.

Full-or-part-time: 2h

Self study: 2h

name english

Full-or-part-time: 4h

Theory classes: 4h



GRADING SYSTEM

The final mark will be the result of 3 test or evaluations. Their respective weightings are:

T1, T2 & T3: 40%

T4 & T5: 30%

Oral presentation & delivering paper: 30%

BIBLIOGRAPHY

Basic:

- Salmerón i Bosch, Carles. Els Ferrocarrils catalans : cent anys d'història. Barcelona: Terminus, 1985. ISBN 8439849117.
- Muñoz Rubio, Miguel, dir. Historia de los ferrocarriles de vía estrecha en España. Madrid: Fundación de los Ferrocarriles Españoles, 2005. ISBN 8488675976.
- Comín, Francisco et al. 150 años de historia de los ferrocarriles españoles. Madrid: Anaya, 1998. ISBN 8488675496.

Complementary:

- Pascual i Domènech, Pere. Los caminos de la era industrial: la construcción y financiación de la Red Ferroviaria Catalana (1843-1989). Barcelona: Edicions de la Universitat de Barcelona, 1999. ISBN 8483381206.
- Pascual, Pere. "L'èxit català en l'assimilació de la tecnologia ferroviària". Maluquer de Motes, Jordi. Tècnics i tecnologia en el desenvolupament de la Catalunya Contemporània. Barcelona: Enciclopèdia Catalana, 2000. pp. 242-249.
- Quereda, José ; Peña, José María. "El Ferrocarril". Ayala Carcedo, F. J. Historia de la tecnología en España. Barcelona: Valatenea, 2001. pp. 397-416.

RESOURCES

Other resources:

Web addresses ICT resources with audiovisual information