Course guide
220221 - 220221 - Railway Systems

Unit in charge: Terrassa School of Industrial, Aerospace and Audiovisual Engineering
Teaching unit: 712 - EM - Department of Mechanical Engineering.

Degree: MASTER'S DEGREE IN INDUSTRIAL ENGINEERING (Syllabus 2013). (Optional subject).
MASTER'S DEGREE IN AERONAUTICAL ENGINEERING (Syllabus 2014). (Optional subject).
MASTER'S DEGREE IN SPACE AND AERONAUTICAL ENGINEERING (Syllabus 2016). (Optional subject).
MASTER'S DEGREE IN RESEARCH IN MECHANICAL ENGINEERING (Syllabus 2021). (Optional subject).

Academic year: 2022 ECTS Credits: 3.0 Languages: English

LECTURER

Coordinating lecturer: Xavier Salueña Berna
Others: Jordi Orta Roca

TEACHING METHODOLOGY

The course is divided into parts:
Theory classes
Practical classes
Self-study for doing exercises and activities.

In the theory classes, teachers will introduce the theoretical basis of the concepts, methods and results and illustrate them with examples appropriate to facilitate their understanding.

In the practical classes (in the classroom), teachers guide students in applying theoretical concepts to solve problems, always using critical reasoning. We propose that students solve exercises in and outside the classroom, to promote contact and use the basic tools needed to solve problems.

Students, independently, need to work on the materials provided by teachers and the outcomes of the sessions of exercises/problems, in order to fix and assimilate the concepts.

The teachers provide the syllabus and monitoring of activities (by ATENEA).

LEARNING OBJECTIVES OF THE SUBJECT

The course provides basic knowledge of the railway as a means of transportation and focuses its scope in the field of industrial engineering. The various topics that have been chosen up as a starting point for everyone who wants to be or has been in railways specialize in this sector. However, the object of the course is more general, to use the railway as a clear example of the application of different specialties so that concur in draft and in its operation. And this also is aimed at anyone who wants to learn how to check and apply in a different case knowledge acquired during the race.

In line with this, the first goal is learning descriptive of knowledge of the facilities track, signals and electrification; vehicles; materials and components; railway operation. The second is a learning analytical formula to deduce and apply through the technical study of some selected cases, the third objective is economic learning to analyze economic aspects of railway activity and assess their viability.

The course includes lectures, demonstration sessions and visits to offices and railway facilities.

STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self study</td>
<td>48,0</td>
<td>64.00</td>
</tr>
<tr>
<td>Hours large group</td>
<td>27,0</td>
<td>36.00</td>
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</tbody>
</table>

Total learning time: 75 h
<table>
<thead>
<tr>
<th>CONTENTS</th>
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</thead>
<tbody>
<tr>
<td><strong>Module 1: Rail layout</strong></td>
</tr>
<tr>
<td><strong>Related activities:</strong> 1,3</td>
</tr>
<tr>
<td><strong>Full-or-part-time:</strong> 9h</td>
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<tr>
<td>Theory classes: 2h</td>
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<tr>
<td>Self study: 7h</td>
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| **Module 2: Geometry, kinematics and effort on the road** |
| **Related activities:** 1,3 |
| **Full-or-part-time:** 20h |
| Theory classes: 10h |
| Self study: 10h |

| **Module 3: Railway, switches and crossings** |
| **Related activities:** 1,2,3 |
| **Full-or-part-time:** 4h |
| Theory classes: 2h |
| Self study: 2h |

| **Module 4: Electrification.** |
| **Related activities:** 1,2,3 |
| **Full-or-part-time:** 6h |
| Theory classes: 2h |
| Self study: 4h |
Module 5: Railway safety. Signs

Description:

Related activities:
1,2,3

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

Module 6: Traction and braking

Description:

Related activities:
1,3,4

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

Module 7: Wheel-rail contact.

Description:

Related activities:
1,3,4

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

Module 8: Wreck action.

Description:
Wreck theory. Formula of Nadal. Discussion.

Related activities:
1,3,4

Full-or-part-time: 12h
Theory classes: 4h
Self study: 8h
Module 9: Cross section. Gauge. Accessibility

Description:

Related activities:
1,3,4

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

Module 10: financial Management

Description:

Related activities:
1,3,4

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

ACTIVITIES

Activity 1: Assistance to Project sessions

Description:
Assistance to Project sessions.

Specific objectives:
Builds a Railroad Project.

Material:
Atenea notes platform.

Delivery:
Project Reports of the practice. Represents 15% of the final evaluation.

Full-or-part-time: 15h
Theory classes: 10h
Self study: 5h
### Activity 2: Examination 1st part

**Description:**
Individual examination and written about the contents of the modules 3,4,5.

**Specific objectives:**
Check the knowledge acquired in the theory sessions of these modules.

**Material:**
Atenea notes platform.

**Delivery:**
Individual exam. This exam can be recovered during the execution of the final exam. Represents 30% of the final grade for the course.

**Full-or-part-time:** 21h
Theory classes: 6h
Self study: 15h

### Activity 3: Work home

**Description:**
Performing the railway problems.

**Specific objectives:**
Check the knowledge acquired in the subject.

**Material:**
Atenea notes platform.

**Delivery:**
Portfolio. It represents 25% of the final grade for the course.

**Full-or-part-time:** 14h
Theory classes: 4h
Self study: 10h

### Activity 4: Final examination

**Description:**
Individual exam and written about the contents of the modules 6,7,8,9,10.

**Specific objectives:**
The exam must demonstrate that the student has acquired and assimilated the concepts, principles and fundamentals related to all these modules.

**Material:**
Atenea notes platform.

**Delivery:**
The deliverable will be the resolution of the exam. Represents 30% of the final grade for the course.

**Full-or-part-time:** 25h
Theory classes: 10h
Self study: 15h
**GRADING SYSTEM**

The final grade depends on the following evaluative acts:

- Activity 1 (project), weight: 15%
- Activity 2 (Exam 1st parc) weight: 30%
- Activity 3 (portfolio) weight: 25%
- Activity 4 (final exam), weight: 30%

Activity 1 will be performed in groups and shall be in writing on the project.
Activity 2 will be performed individually in person and in writing.
Activity 3 will be held individually and delivered by Atenea.
Activity 4 will take place individually in person and in writing.

In the activity 2 it will be possible to redirect the result if the result is unsatisfactory (less than 5) presenting a recovery on the day of the final evaluation (final exam), in the same time.