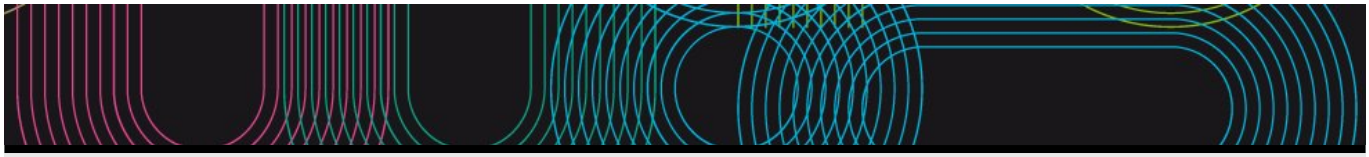

| IDENTIFYING DATA | | | | |
|---|---|---|---|---|
| **Automobiles and railways** | | | | |
| Subject | Automobiles and railways | | | |
| Code | V12G380V01941 | | | |
| Study programme | Degree in Mechanical Engineering | | | |
| Descriptors | ECTS Credits | Choose | Year | Quadmester |
| | 6 | Optional | 4th | 1st |
| Teaching language | Spanish<br>Galician | | | |
| Department | | | | |
| Coordinator | Izquierdo Belmonte, Pablo | | | |
| Lecturers | Izquierdo Belmonte, Pablo | | | |
| E-mail | pabloizquierdob@uvigo.es | | | |
| Web | http://faitic.uvigo.es | | | |
| General description | Knowledges on vehicles cars and rail vehicles: description of his elements and vehicular dynamics | | | |

| Competencies | |
|---|---|
| Code | |
| B3 | CG3 Knowledge in basic and technological subjects that will enable students to learn new methods and theories, and provide them the versatility to adapt to new situations. |
| B4 | CG4 Ability to solve problems with initiative, decision making, creativity, critical thinking and the ability to communicate and transmit knowledge and skills in the field of industrial engineering in Mechanical specialty. |
| C13 | CE13 Knowledge of the principles of the theory of machines and mechanisms. |
| C20 | CE20 Knowledge and abilities to calculate, design and test machines. |
| D3 | CT3 Oral and written proficiency. |
| D6 | CT6 Application of computer science in the field of study. |
| D10 | CT10 Self learning and work. |
| D16 | CT16 Critical thinking. |
| D17 | CT17 Working as a team. |
| D20 | CT20 Ability to communicate with people not expert in the field. |

| Learning outcomes | | |
|---|---|---|
| Expected results from this subject | Training and Learning Results | |
| Comprise the operation of the main systems of the car and of the railway | B3<br>B4 | D10<br>D16 |
| Skill to make calculations of vehicular dynamics | C13<br>C20 | D6<br>D10<br>D16 |
| Capacity to design systems and components of the car and of the railway | | D3<br>D6<br>D10<br>D16<br>D17<br>D20 |

| Contents | |
|---|---|
| Topic | |
| Introduction to the theory of the vehicles cars. | - The vehicle car, concept.<br>- Main requests of the vehicle car.<br>- The system man-machine-half.<br>- Objective and scope of the theory of the vehicles cars |

| | |
|---|---|
| Interaction between the vehicle and the surface of rolling | - Characteristic generals and mechanics of the tyre, mechanical characteristics.<br>- Study of longitudinal efforts (traction, braked) and *trasversales (derive).<br>- Mathematical models floor-wheel |
| Aerodynamics of the cars | - Aerodynamic actions on the solids, general concepts<br>- aerodynamic Actions on the vehicle car. |
| Longitudinal dynamics. Provision | - Dynamic longitudinal: Resistance to the movement. And fundamental Equation of the longitudinal movement<br>- Provision: estimate of provision of the vehicle<br>- tractive Effort maximum and limitation by the *adherencia. |
| Braked of vehicles cars | - Strengths and moments that act in the process of braked.<br>- Conditions imposed by the *adherencia for braked optimum.<br>- System of braked and process of braked.<br>- The system *ABS |
| The system of *transmión | - Characteristic of the engine and transmission.<br>- Principles of design of the system of transmission and his elements |
| Lateral dynamics of the vehicle | - Analysis of the transversal behaviour of the vehicle<br>- of the system of direction<br>- Geometry of the direction.<br>- Manoeuvrability to low speed.<br>- Speed limit of *derrape and dump.<br>- Directional behaviour of the vehicle in diet *estacionario. |
| The system of suspension | - Analysis of the vertical behaviour of the vehicle and of the system of suspension.<br>- The vibrations on the vehicle, action on the human being.<br>- The system of suspension: mathematical model.<br>- Cinematic of the suspension.<br>- Systems of suspension: elastic elements and of absorption.<br>- Influence of the suspension in the behaviour of the vehicle.<br>- Adjustments of the suspension. |
| Systems of security in the car | - Active and passive security.<br>- Systems of help to the driving: control of traction and stability, *ABS.<br>- Influence of the technician of driving.<br>- The passive security: structures *deformables, cell of security, belts of security, *airbag.<br><br>- Analysis of the road infrastructure: Influence of the road infrastructure in the dynamic behaviour of the vehicle<br><br>- Reforms of importance in vehicles cars: Rule and execution of reforms |
| Railways | - Rail infrastructures<br>- Typology of vehicles railways<br>- Systems of the rail vehicles: traction, suspension, etc.<br>- Elements *rodantes |

## Planning

| | Class hours | Hours outside the classroom | Total hours |
|---|---|---|---|
| Lecturing | 15 | 32 | 47 |
| Problem solving | 15 | 30 | 45 |
| Laboratory practical | 5 | 6 | 11 |
| Computer practices | 12 | 12 | 24 |
| Essay questions exam | 3 | 0 | 3 |
| Practices report | 0 | 20 | 20 |

*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

## Methodologies

| | Description |
|---|---|
| Lecturing | Exhibition of the subjects with multimedia support |
| Problem solving | Resolution of problems of the different contents |
| Laboratory practical | Analysis of real elements of the car |
| Computer practices | Calculations and simulations of the vehicular behaviour |

## Personalized assistance

| Methodologies | Description |
|---|---|
| Problem solving | Resolution of doubts during the session. Supervision of the professor in the classroom with attention to demand for explanation of contents. *Tutorías Personalised for explanation of doubts in the resolution of exercises. |
| Laboratory practical | Review put to place |
| Computer practices | Review put to place |
| Lecturing | Resolution of doubts during the session. *Tutorías Personalised for explanation of doubts in the contents given. |

**Assessment**

| | Description | Qualification | Training and Learning Results | | |
|---|---|---|---|---|---|
| Essay questions exam | Proof written, theory and problems | 80 | B3<br>B4 | C13<br>C20 | D3<br>D6<br>D10<br>D16<br>D17<br>D20 |
| Practices report | Assistance with *aprovechamiento to the practices and preparation of reports of the practices made and realisation of the relative proofs to the practical session (laboratory or classroom of computing) | 20 | B3<br>B4 | C13<br>C20 | D3<br>D6<br>D10<br>D16<br>D17<br>D20 |

**Other comments on the Evaluation**

The matter will approve obtains an equal qualification or elder that a 5 how final note, obtained of the following form:- by the assistance with *aprovechamiento to &the *quot;Practices in classrooms of computer/laboratory&*quot;, the preparation of reports/memory of practice and resolution of the exercises proposed&*nbsp;(continuous evaluation of 20%).- By the realisation of &*quot;Proofs of long answer, of development&*quot; in the planned dates in January (first edition) and June (second edition) as it establish the school (final examination of 80%).Only the students that renounce&*nbsp;to the continuous evaluation in the terms established will have right the realisation of a proof of exercises (equivalent to&*nbsp;the continuous evaluation of 20%) in the same date of the examination.Will employ a system of numerical qualification of 0 to 10 points second the legislation collected in the *RD 1125/2003 of 5&*nbsp;of September, BOE of 18 September* ethical Commitment: it expects that the present student a suitable ethical behaviour. In the case to detect a no ethical behaviour&*nbsp;(copy, plagiarism, utilisation of unauthorised electronic devices, and others) will consider that the student does not gather the&*nbsp;necessary requirements to surpass the matter. In this case the global qualification in the present academic course will be&of *nbsp;suspense (0.0).

**Sources of information**

**Basic Bibliography**

Casqueiro, Carlos, **Apuntes de teoría de Automoviles**, 2011

Pablo Luque, **Ingeniería del automóvil : sistemas y comportamiento dinámico**, Thomson, 2004

Manuel Arias-Paz, **Manual de Automóviles**, Dossat, 2001

**Complementary Bibliography**

Cascajosa Soriano, Manuel, **Ingeniería de vehículos : sistemas y cálculos**, Tébar, 2007

José Font Mezquita, **Tratado sobre automóviles**, UPV, 2006

**Recommendations**

**Subjects that it is recommended to have taken before**

Mechanism and machine theory/V12G380V01306
Machine design I/V12G380V01304