



## IDENTIFYING DATA

### Automobile Vehicles

Subject	Automobile Vehicles			
Code	V04M141V01323			
Study programme	(*)Máster Universitario en Enxeñaría Industrial			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	4.5	Optional	2nd	1st
Teaching language	Spanish Galician			
Department				
Coordinator	Izquierdo Belmonte, Pablo			
Lecturers	Izquierdo Belmonte, Pablo			
E-mail	pabloizquierdob@uvigo.es			
Web	<a href="http://fatic.uvigo.es">http://fatic.uvigo.es</a>			
General description	Knowledges on vehicles cars: description of his elements and vehicular dynamics			

## Competencies

Code	
A2	That the students can apply their knowledge and their ability to solve problems in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their field of study.
A3	That students are able to integrate knowledge and handle complexity and formulate judgments based on information that was incomplete or limited, include reflecting on social and ethical responsibilities linked to the application of their knowledge and judgments.
C1	CET1. Project, calculate and design products, processes, facilities and plants.
C14	CTI3. Ability to design and test machines.
C32	CIPC5. Knowledge of methods and techniques of transportation and industrial maintenance.

## 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	A2 A3	C1 C14 C32
Skill to make calculations of vehicular dynamics	A2 A3	C1 C14 C32
Capacity to design systems and components of the car and of the railway	A2 A3	C1 C14 C32
Capacity to analyse the dynamic provision of a vehicle.	A2 A3	C1 C14 C32
Purchase knowledges on the homologation of vehicles.	A2 A3	C1 C14 C32
Capacity to project reforms of importance in vehicles cars according to the valid regulation.	A2 A3	C1 C14 C32

## Contents

## Topic

Introduction to the vehicles cars.	<ul style="list-style-type: none"> <li>- The vehicle car, concept.</li> <li>- Main requests of the vehicle car.</li> <li>- The system man-machine-half.</li> <li>- Objective and scope of the theory of the vehicles cars</li> </ul>
Interaction of the vehicle with the half.	<ul style="list-style-type: none"> <li>- Interaction between the vehicle and the surface of rolling: general Characteristics and mechanics of the tyre, mechanical characteristics. Study of longitudinal efforts (traction, braked) and *trasversales (derive). Mathematical models.</li> <li>- Aerodynamic of the cars: aerodynamic Actions on the solids, general concepts. Aerodynamic actions on the vehicle car.</li> </ul>
Analysis of the road infrastructure for cars and railways.	<ul style="list-style-type: none"> <li>- Influence of the road infrastructure in the dynamic behaviour of the vehicle</li> </ul>
Analysis of the longitudinal behaviour of the vehicle: traction and braked.	<ul style="list-style-type: none"> <li>- Dynamic longitudinal. Provision: Resistance to the movement. Fundamental equation of the longitudinal movement. Tractive effort maximum limited by the *adherencia.</li> <li>- Characteristic of the engine and transmission.</li> <li>- Prediction of the provision of a vehicle.</li> <li>- Braked of vehicles cars: Strengths and moments that act in the process of braked. Conditions imposed by the *adherencia: braked optimum. The process of braked. The system *ABS</li> </ul>
Analysis of the transversal behaviour of the vehicle and of the system of direction (lateral Dynamics of the vehicle)	<ul style="list-style-type: none"> <li>- Geometry of the direction.</li> <li>- Manoeuvrability to low speed.</li> <li>- Speed limit of *derrape and dump.</li> <li>- Directional behaviour of the vehicle in diet *estacionario.</li> </ul>
Analysis of the vertical behaviour of the vehicle and of the system of suspension.	<ul style="list-style-type: none"> <li>- The vibrations on the vehicle, action on the human being.</li> <li>- The system of suspension: mathematical model.</li> <li>- Cinematic of the suspension.</li> <li>- Systems of suspension: elastic elements and of absorption.</li> <li>- Influence of the suspension in the behaviour of the vehicle.</li> <li>- Adjustments of the suspension.</li> </ul>
Systems of security in the vehicle.	<ul style="list-style-type: none"> <li>- Active and passive security.</li> <li>- Systems of help to the driving: control of traction and stability, *ABS.</li> <li>- Influence of the technician of driving.</li> <li>- The passive security: structures *deformables, cell of security, belts of security, *airbag.</li> </ul>
Reforms of importance in vehicles cars.	<ul style="list-style-type: none"> <li>- Normative and execution of reforms</li> </ul>
Rail material: *Bogies, cars, systems of braked and of traction, systems of suspension.	<ul style="list-style-type: none"> <li>- Infrastructure</li> <li>- Systems of the rail vehicles: traction, suspension, etc.</li> <li>- Elements *rodantes</li> </ul>

## Planning

	Class hours	Hours outside the classroom	Total hours
Lecturing	10	20	30
Problem solving	10	20	30
Laboratory practical	8	6	14
Computer practices	8	6	14
Practices report	0	22.5	22.5
Essay questions exam	0	2	2

\*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	
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) and activities of individual work	30	A2 A3	C1 C14 C32
Essay questions exam	Proof written, theory and problems	70	A2 A3	C1 C14 C32

### 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 "Practices in classrooms of computer/laboratory";, the preparation of reports/memory of practice and resolution of the exercises proposed (continuous evaluation of 30%).- By the realisation of "Proofs of long answer, of development" in the planned dates in January (first edition) and June (second edition) as it establish the school (final examination of 70%).Only the students that renounce to the continuous evaluation in the terms established will have right the realisation of a proof of exercises (equivalent to the continuous evaluation of 30%) in the same date of the examination.Can \*suplir the half of the qualification of the "Proofs of long answer, of development" (final examination of 70%) by a work to define between the \*profesorado and the student, as well as his public exhibition.Will employ a system of numerical qualification of 0 to 10 points second the legislation collected in the \*RD 1125/2003 of 5 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 (copy, plagiarism, utilisation of unauthorised electronic devices, and others) will consider that the student does not gather the necessary requirements to surpass the matter. In this case the global qualification in the present academic course will be of 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

Mechanical Engineering Design/V04M141V01114

Mechanical Engineering Design/V04M141V01214

Mechanism and machine theory/V12G380V01306

Machine design I/V12G380V01304