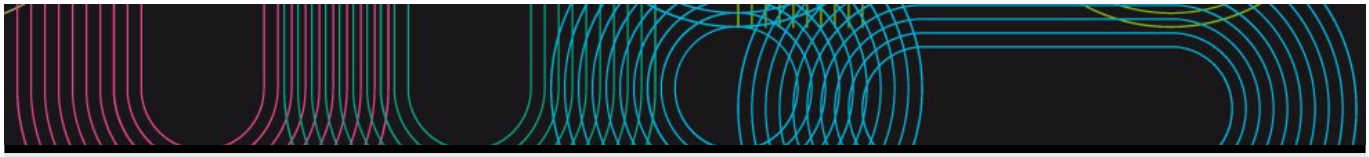

IDENTIFYING DATA				
Automobile Vehicles				
Subject	Automobile Vehicles			
Code	V04M141V01323			
Study programme	(*)Máster Universitario en Enxeñaría Industrial			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	4.5	Optional	2nd	1st
Teaching language	Spanish Galician			
Department				
Coordinator	Izquierdo Belmonte, Pablo			
Lecturers	Izquierdo Belmonte, Pablo			
E-mail	pabloizquierdob@uvigo.es			
Web	http://faitic.uvigo.es			
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.	- The vehicle car, concept. - Main requests of the vehicle car. - The system man-machine-half. - Objective and scope of the theory of the vehicles cars
Interaction of the vehicle with the half.	- 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. - Aerodynamic of the cars: aerodynamic Actions on the solids, general concepts. Aerodynamic actions on the vehicle car.
Analysis of the road infrastructure for cars and railways.	- Influence of the road infrastructure in the dynamic behaviour of the vehicle
Analysis of the longitudinal behaviour of the vehicle: traction and braked.	- Dynamic longitudinal. Provision: Resistance to the movement. Fundamental equation of the longitudinal movement. Tractive effort maximum limited by the *adherencia. - Characteristic of the engine and transmission. - Prediction of the provision of a vehicle. - 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
Analysis of the transversal behaviour of the vehicle and of the system of direction (lateral Dynamics of the vehicle)	- Geometry of the direction. - Manoeuvrability to low speed. - Speed limit of *derrape and dump. - Directional behaviour of the vehicle in diet *estacionario.
Analysis of the vertical behaviour of the vehicle and of the system of suspension.	- The vibrations on the vehicle, action on the human being. - The system of suspension: mathematical model. - Cinematic of the suspension. - Systems of suspension: elastic elements and of absorption. - Influence of the suspension in the behaviour of the vehicle. - Adjustments of the suspension.
Systems of security in the vehicle.	- Active and passive security. - Systems of help to the driving: control of traction and stability, *ABS. - Influence of the technician of driving. - The passive security: structures *deformables, cell of security, belts of security, *airbag.
Reforms of importance in vehicles cars.	- Normative and execution of reforms
Rail material: *Bogies, cars, systems of braked and of traction, systems of suspension.	- Infrastructure - Systems of the rail vehicles: traction, suspension, etc. - Elements *rodantes

Planning

	Class hours	Hours outside the classroom	Total hours
Lecturing	10	20	30
Problem solving	10	20	30
Laboratory practical	8	6	14
Practices through ICT	8	6	14
Essay	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
Practices through ICT	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
Practices through ICT	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	The work contemplates so much the parts of autonomous work, individual or *grupal, like relative proofs to the development of said works, in concrete: - 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) - Realisation of activities and descriptive visual questionnaires, and delivery and review of the same. - Others optional	40	A2 A3	C1 C14 C32
Essay questions exam	Proof written, theory and problems	60	A2 A3	C1 C14 C32

Other comments on the Evaluation

- The qualification of the continuous evaluation will have a weight of 40% (4 points on 10) in the final note of the matter, and divides in two parts:

By a part, the realisation of the activities and practical □*P□, including deliver/test associated, corresponds to 15% (5+5+5) of the final qualification (1,5 points on 10), including the participation in the activities published in *Faitic previously and for the session, and deliver them/test requested. To be able to consider the part *P in the final qualification, owe to make all the activities described.

On the other hand, the realisation of questionnaires □*Q□ descriptive, according to the instructions given, including the participation in the activities published in *Faitic on the systems of vehicles cars, and, likewise, the realisation and review of the remaining questionnaires □*Q□ posed by the other groups, corresponds to 25% (5+5+15) of the final qualification (2,5 points on 10). Inside this percentage includes the realisation of an individual proof of continuous evaluation on said questionnaires *Q, to make the same day that the final examination. The questions will not be necessarily of type test, but also can be of short answer, and no necessarily equal to the developed previously, but of the same typology. To be able to consider the part *Q in the final qualification, have to make all the activities described, included the individual proof of corresponding continuous evaluation.

- The students with RENUNCIATION to continuous qualification, HAS TO CONTACT WITH THE *PROFESORADO to indicate that it wishes to make a proof that *supla the no realisation of the activities □*P□ and □*Q□, of such way that said part can him describe with a specific proof that will take place in the same date that the final examination. This specific proof will cover

the relative contents to the activities and practical □*P□ and his deliveries/test associated and to the questionnaires □*Q□ descriptive (on a total of 4 points: 1,5+2,5 points).&*nbsp;

- The qualification of the final examination will have a corresponding weight to the remaining 60% (6 points on 10) in the final note of the matter, and will be able to have diverse typologies of activities of evaluation:

corresponding Activities to the part of CALCULATION, that will be roughly 75%-85% of the examination (4-5 points on 6, roughly), and corresponding activities to the DESCRIPTIVE part, that will be roughly the remaining 15%-25% of the examination (1-2 points on 6, roughly).

To consider said correct activities, the calculations made will have to be clearly justified and will require accuracy in the solution and coherence in the approach. Likewise, the activities will be exercises and/or questions, and these last will not be necessarily of type test, but also can be of brief explanation or short answer.

The part of CALCULATION covers all the relative contents to the vehicle and his behaviour. The DESCRIPTIVE part covers no only the contents of systems of vehicles cars (*T1 to *T4) but also the corresponding contents to the subjects *T5 of security, homologation-inspection-reforms, infrastructures,□ and *T6 of rail and material vehicles *rodante.&*nbsp;&*nbsp;

In the final examination demands a minimum punctuation of 2,5 points on 6 so that it can take into account the part of qualification of the continuous evaluation. In case of not to reach said value, the final qualification will be the corresponding only to the examination, without considering the part of continuous evaluation, that will conserve for the second edition.

In the case to reach said minimum punctuation in the examination, the final qualification will be the sum of the qualification of the examination (on 6 points) and the qualification of the two parts, □*P□ and □*Q□, of the continuous evaluation (on 4 points), being necessary to reach a 5,0 to surpass the matter.In the case of GOES, offers the possibility to make an additional exercise of calculation of provision and a descriptive work (and his exhibition) relative to the systems of a concrete vehicle, with some punctuations of 1 point and 2 points respectively, remaining like this the final examination on a maximum punctuation of 3 points (instead of 6), being necessary to obtain a minimum punctuation of 1,25 points on 3 so that it can take into account the additional exercise of calculation (1 point) and the additional descriptive work (2 points), as well as the continuous evaluation (4 points).

&*nbsp;

Will employ a system of numerical qualification of 0 to 10 points with a decimal.

* Ethical commitment: it expects that the present student a suitable ethical behaviour (is connoisseur of said commitment, so much of the School, as of the published by the University). In the case to detect a no ethical behaviour (copy, plagiarism, utilisation of means, included electronic devices, unauthorised, 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

Contingency plan

Description

The educational methodologies will give , to be necessary, adapting them to the telematic *means that put the disposal of the *profesorado, in addition to the documentation facilitated by **FAITIC and other platforms, email, etc.
In the measure of the possible, will prevail the teaching of the theoretical contents by telematic *means as well as those contents of practices of problems, classroom of computing, and others, that was possible to be **virtualizados, or given in classrooms wider to fulfil with the rule of occupation and **distnaciamento in force, tried **mater to **presencialidade for the practices *experience of laboratory, with groups reduced. In the case of not being able to be given of face-to-face form, those contents in the **virtualizables will give or *suplirán by other (autonomous work **guíado, etc.) that allow to achieve equally to the **competencais associated to them.

The **titorías will develop indistinctly of face-to-face form (whenever it was possible and guarantee the sanitary measures) and *telematic (*email and others) *respecting the schedules of **titorias planned. **Asemade, will do a *adecuación **metodolóxica to the students of risk, **facilitándlle additional specific information, to accredit that it can not have access to the contents given of conventional form.

Additional information on the evaluation: **manteñense those proofs that already come making of telematic *form and, in the measure of the possible, will keep the face-to-face proofs adapting them the normative **santaria valid. The proofs will develop of face-to-face form except Resolution *Rectoral that indicate that they have to do of form no face-to-face, making gave way through the distinct tools put the disposal of the *profesorado. Those no attainable proofs of telematic *form *suplirán by other (deliveries of autonomous work **guíado, etc.)
- Indicate, in this *ultimo case, to be **necesraio, the new weights of the evaluation. If they do not change the weights of evaluation, indicate it:
they keep the criterion of evaluation adapting the realisation of the proofs, in the case to be necessary and by indication in Resolution *Rectoral, to the telematic *means put the disposal of the *profesorado