



IDENTIFYING DATA

Fluidmechanic systems and advanced materials for transportation

Subject	Fluidmechanic systems and advanced materials for transportation			
Code	V12G380V01942			
Study programme	Grado en Ingeniería Mecánica			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	12	Optional	4th	1st
Teaching language	Spanish			
Department				
Coordinator	Cristóbal Ortega, María Julia Gil Pereira, Christian			
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General description	<p>It treats of a matter of 4º Course of the Intensification of Transport in Mechanical Engineering. The matter structures in two very differentiated parts:</p> <p>Block I: Systems *fluidomecánicos for the transport, devoted to the study of the flows of interest in the industry of the car and in the remaining means of transport.</p> <p>Block II: Materials advanced for the transport, whose aim is that the student know the diverse materials that apply to the design, operation of vehicles for terrestrial transport, maritime and aerial.</p> <p>Both blocks will give simultaneously and of independent form along the first *cuatrimestre. Given the specificity of each one of the parts considered, the educational methodologies will adapt to each one of them. Likewise, the system of evaluation keeps clearly differentiated, to adapt better to the characteristics of each part of the matter.</p>			

Training and Learning Results

Code	
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.
B6	CG6 Capacity for handling specifications, regulations and mandatory standards.
B7	CG7 Ability to analyze and assess the social and environmental impact of the technical solutions.
B8	CG8 Ability to apply the principles and methods of quality.
C24	CE24 Applied knowledge of the basics of fluidmechanics systems and machines.
C25	CE25 Knowledge and skills for engineering materials.
D10	CT10 Self learning and work.
D17	CT17 Working as a team.

Expected results from this subject

Expected results from this subject	Training and Learning Results
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- Knowledge of complex flows and his application in the design and operation of vehicles for terrestrial transport, maritime and aerial. B4 C24 D10
- Capacity for the design of the distinct installations of fluids of the main components of the vehicles for terrestrial transport, maritime and aerial.. B6 C25 D17
- Capacity for the design of the distinct installations of fluids of the industry of the transport and affine industries B7 B8

- Knows the basic requests of the industry of the transport and affine industries for the realisation of a suitable selection of materials.
- It knows the evolution of the distinct types of materials that employ in the main components of the vehicles for terrestrial transport, maritime and aerial and of the processes for his possible forming.
- It knows the distinct types of materials.
- It selects the most adapted materials for the distinct applications inside the industry of the transport and affine industries
- Knows the new materials employed in this industry.
- It understands the specifications of purchase of materials.
- It identifies of effective way the causes of failure in service derived of the material employed.
- It analyses and it proposes operative solutions to problems in the field of the engineering of materials.
- It drafts texts with the suitable structure to the aims of communication. It presents the text to a public with the strategies and the suitable means
- Shows capacities of communication and work in team.
- It identifies the own needs of information and uses the means, spaces and available services to design and execute suitable researches to the thematic field.
- It carries to term the works entrusted from the basic orientations given by the professor, deciding the length of the parts, including personal contributions and expanding sources of information.

Contents

Topic

BLOCK I: SYSTEMS *FLUIDOMECHANICS FOR THE TRANSPORT	1. EXTERNAL FLOWS. STRENGTHS ON BODIES IN THE BREAST OF A FLUID. RESISTANCE. *SUSTENTACION. 2. COMPRESSIBLE FLOWS. OPERATION OF CONVERGENT And DIVERGENT NOZZLES. FLOW IN PIPES WITHOUT FRICTION And WITH ADDITION OF HEAT. 3. TURBULENT FLOWS. TURBULENCE. TURBULENT MODELS. 4. FLOW *LAMINAR. *LUBRICACION. 5. *ELECTRONEUMATICA. *HIDRAULICA. 6. *FORMACION OF *CONTAMINANTES. DEVICES *ANTICONTAMINACION. 7. *TURBOMAQUINAS COMPOUND.
BLOCK II: MATERIALS ADVANCED IN THE INDUSTRY OF THE TRANSPORT	1.- REQUESTS IN THE INDUSTRY OF THE TRANSPORT: Rules. *Aligeramiento In the weight of the vehicle. 2.- EVOLUTION OF THE MATERIALS And His TECHNOLOGIES.- Mechanisms of increase of resistance. *Encausado. Criteria of selection of materials: Corrosion and protection against corrosion. 3.- MATERIAL ADVANCED IN THE INDUSTRY OF THE CAR. Materials for bodywork (Steels advanced, light alloys, compound materials). Materials for mechanical Systems. Materials for *revestimiento inner. Recycled. 4.- MATERIAL IN OTHER INDUSTRIES OF TRANSPORT. Railway. Naval construction. Aeronautical industry

Planning

	Class hours	Hours outside the classroom	Total hours
Introductory activities	1	0	1
Lecturing	40.2	81	121.2
Practices through ICT	7.5	7	14.5
Laboratory practical	15	15	30
Studies excursion	3	0	3
Lecturing	19	38	57
Practices through ICT	6	9	15
Case studies	4	12	16
Studies excursion	4	0	4
Essay	1	15	16
Problem and/or exercise solving	2	0	2
Laboratory practice	2.3	0	2.3

Report of practices, practicum and external practices	0	6	6
Case studies	0	10	10
Objective questions exam	2	0	2

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

Methodologies	
	Description
Introductory activities	In this activity detail the characteristics of the matter, justifying the peculiarities of the two blocks of content. They explain the methodologies employed in the same, as well as the system of evaluation employed. Presentation of the application in the platform **FAITIC
Lecturing	BLOCK I: they explain the foundations of each subject for back resolution of practical problems. Will be able to make activities eat: Session *magistral Readings bibliographic Review Summary Diagrams Solution of problems Conferences oral Presentation
Practices through ICT	BLOCK I: they will apply the concepts explained in class by means of the utilisation of computer teams. Will be able to make : practical Cases Simulation Solution of problems
Laboratory practical	BLOCK I: they will apply the concepts developed of each subject to the realisation of practices of laboratory. Fundamentally, they will make activities of experimentation, although they also will be able to make: practical Cases Simulation Solution of problems Learning *colaborativo
Studies excursion	BLOCK I: they will make gone out to distinct companies of the surroundings of the sector of automation.
Lecturing	BLOCK II: MATERIALS ADVANCED. Exhibition by part of the professor of the main contents of each subject. The student will have of the precise documentation for the follow-up of the presentation (*FAITIC). In these sessions *s *emarcarán the guidelines of the works that the students will have to develop later, of individual way the in group
Practices through ICT	BLOCK II: MATERIALS ADVANCED. They will make examples of selection of materials by means of programs it computer *CesEdu-*Pack
Case studies	BLOCK II: MATERIALS ADVANCED. In the classroom will propose to the students the study of concrete cases, in which they will have to make the research, critical review and organisation of the corresponding information and proposal of solutions. Works in group.
Studies excursion	BLOCK II: they will make gone out the distinct companies of the surroundings to know the materials employed in distinct components of vehicles, as well as the processes of manufacture, if possible.

Personalized assistance	
Methodologies	Description
Lecturing	The schedule of *tutorías will publish to the start of the course in the platform of *teledocencia.
Practices through ICT	Personalised attention. During his development the educational will attend and will resolve the doubts of the students.
Laboratory practical	Personalised attention. During his development the educational will attend and will resolve the doubts of the students.
Lecturing	Personalised attention. During his development the educational will attend and will resolve the doubts of the students.
Practices through ICT	Personalised attention. During his development the educational will attend and will resolve the doubts of the students.
Studies excursion	Personalised attention. During his development the educational will attend and will resolve the doubts of the students.
Case studies	Personalised attention. During his development the educational will attend and will resolve the doubts of the students.

Introductory activities Personalised attention. During his development the educational will attend and will resolve the doubts of the students.

Tests	Description
Essay	Personalised attention. During his development the educational will attend and will resolve the doubts of the students.

Assessment

	Description	Qualification	Training and Learning Results		
Essay	Evaluation block I (*SF): Work or works related with the continuous evaluation in which the student will apply the knowledges purchased in the part of the matter Systems *Fluidomecánicos for the transport.	3	B4 B6 B7 B8	C24	D10 D17
Problem and/or exercise solving	Evaluation block I (*SF): - partial Proof, that can include the resolution of problems, practical questions or theoretical concepts. 6% - partial Proof in the official date fixed by the school, that can include the resolution of problems, practical questions or theoretical concepts. 34%. The minimum note required in this proof will be of 4 on 10.	40	B4 B6 B7 B8	C24 C25	D10 D17
Laboratory practice	Evaluation block I (*SF): the evaluation of the practical will be able to include reports and periodic deliveries, individual works/*grupales, exhibitions and resolution of problems or practical questions. The minimum note required in this part will be of 4 on 10.	19	B4 B6	C24	D10 D17
Report of practices, practicum and external practices	Evaluation block II (Material Advanced): it will value the assistance and participation of the student, as well as the reports that deliver periodically.	6	B7		D10
Case studies	Evaluation block II (Material Advanced): it will value the work made by the student in the works proposed for his work in group. It will value the capacity of analysis and structuring of the information *recopilada, the solution proposed and the editorial of the work. Also will take into account the public exhibition made.	6	B4 B6 B7 B8	C25	D10 D17
Objective questions exam	Evaluation block II (Material Advanced: it will make by means of a proof written (short questions and type test) that collect the knowledges purchased by the student along the course. This will make in the date fixed by the centre.	26	B4	C25	

Other comments on the Evaluation

So that the matter consider surpassed the student will have to reach at least a minimum note of 40% in each block, and obtain an upper total qualification to 50%. In case to have an upper qualification to 50%, but not reaching the minimum required in any of the parts, will award a maximum note of 4.5. BLOCKS I And II (*SF And MATERIAL ADVANCED) global Evaluation: in the two official editions the renunciation to the continuous evaluation and election of the system of global evaluation will make following the procedure and the term established by the centre. It will consist of an only examination written that will have a weight of 100% of the note and will evaluate all the theoretical and practical contents of the subject. Ordinary announcement: Continuous Evaluation. Will consist of distinct proofs made during the teaching of the subject and a final proof in the official date previously fixed by the centre. Extraordinary announcement: continuous Evaluation. Will keep the note of the practical part of the continuous evaluation and will make a final proof in the official date previously fixed by the centre. Ethical behaviour: expects that the present student a suitable ethical behaviour, attending especially to the indicated in the Articles 39, 40, 41 and 42 of the Regulation on the evaluation, the qualification and the quality of the teaching and of the process of learning of the *estudiantado of the *Universidade of Vigo (approved in the *claustro of 18 April 2023). WARN: In case of discrepancies between the distinct linguistic versions of the guide will prevail the indicated in *laversión in Spanish

Sources of information

Basic Bibliography

F. White Tr- Concepción Paz Penín, **Mecánica de Fluidos**, VI,

J. Tu, G. Yeoh, C., **Computational Fluid Dynamics: A Practical Approach**,

Complementary Bibliography

C. Mataix, **Turbomáquinas Hidráulicas**,

Fluent Inc, **Fluent User Guide**,

Yunus A. Cengel, John M. Cimbala, **Fluid Mechanics: Fundamentals and Applications**,

M. F. Asbhy, **Materials Selection in Mechanical Design**, 4th. Ed. Butterworth-Heinemann, Elsevier,

Geoff Davies, **Materials for Automobile Bodies**, Butterworth-Heinemann, Elsevier,
H-H. Braess, U. Seiffert, **Handbook of Automotive Engineering**, SAE International,
R.E. Smallman, A.H.W. Ngan, **Physical Metallurgy and Advanced Materials**, 7 th. Ed., Butterworth-Heinemann, Elsevier,
Crespo, **Mecánica de Fluidos**, Editorial Paraninfo,
Fluent User Guide,

Recommendations

Subjects that are recommended to be taken simultaneously

Automobiles and railways/V12G380V01941

Powertrain systems/V12G380V01943

Subjects that it is recommended to have taken before

Materials science and technology/V12G380V01301

Fluid mechanics/V12G380V01405

Materials engineering/V12G380V01504

Fluid machines/V12G380V01505

Other comments

Requirements:

To enrol in this matter is necessary to have surpassed or be enrolled of all the matters of the inferior courses to the course in which it is situated this matter.

In case of discrepancies will prevail the version in Spanish of this guide.
