



IDENTIFYING DATA

Hydraulic Machines

Subject	Hydraulic Machines			
Code	V04M141V01116			
Study programme	(*)Máster Universitario en Enxeñaría Industrial			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	3	Mandatory	1st	1st
Teaching language				
Department				
Coordinator	Martín Ortega, Elena Beatriz			
Lecturers	Martín Ortega, Elena Beatriz Meis Fernández, Marcos			
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General description	*Materia That *capacita to analyse and project machines of fluids, his installations and his exploitation. Likewise *capacita to project pneumatic and hydraulic installations and *dimensionar his elements			

Competencies

Code	
C1	CET1. Project, calculate and design products, processes, facilities and plants.
C9	CET9. Knowing how to communicate the conclusions -and the knowledge and rationale underpinning these, to specialist and non-specialist audiences clearly and unambiguously.
C10	CET10. Possess learning skills that will allow further study of a self-directed or autonomous mode.
C16	CTI5. Knowledge and skills for the design and analysis of thermal machines and engines, hydraulic machines and facilities for heat and industrial refrigeration
D1	ABET-a. An ability to apply knowledge of mathematics, science, and engineering.
D3	ABET-c. An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
D5	ABET-e. An ability to identify, formulate, and solve engineering problems.
D11	ABET-k. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Learning outcomes

Expected results from this subject	Training and Learning Results
Capacity to analyse and project machines of fluids, his installations and his exploitation	C1 C9 C10 C16 D1 D3 D5 D11
Capacity to project pneumatic and hydraulic installations and for *dimensionar his elements	C1 C9 C10 C16 D1 D3 D5 D11

Contents	
Topic	
1. *Introduccion	General theory of the design of hydraulic Machines
2. Design of *turbobombas	1. Design of *turbobombas radial or centrifugal 2. Design of *turbobombas axial and diagonals 3. Constitutive elements of *turbobombas 4. Selection and regulation of bombs
3. Design of turbines of action and reaction	Turbines of action: 1. Project of turbines *Pelton Turbines of reaction: 2. Project of axial turbines. *Kaplan 3. Project of radial turbines. Francis 4. Constitutive elements of hydraulic turbines 5. Hydroelectric head offices
4. *Turbomáquinas Compound. Hydrodynamic transmissions	1. Classification 2. General theory 3. *Turboacoplamientos 4. *Turboacoplamientos With variators of speed 5. *Turboconvertidores Of pair 6. Multiple hydraulic transmissions 7. Hydrodynamic brake
5. Design and selection of pneumatic elements	Design of *MNDP Pneumatic Machines of Positive Trip: Compressors, Engines and linear Actuators
6. Design and selection of hydraulic elements	Design of valves *hidraulicas: Valves and elements of control, constitutive of the hydraulic circuits Design of elements of hydraulic: Design of Auxiliary Elements of the *Circuitos Hydraulic
You practise	1. Design of hydraulic Machine through *CFD. Software *Fluent 2. Exit of study for visit to company related with the sector. It will realise in function of the availability of the companies

Planning

	Class hours	Hours outside the classroom	Total hours
Troubleshooting and / or exercises	6	6	12
Outdoor study / field practices	3	0	3
Practice in computer rooms	1.5	0	1.5
Tutored works	12.5	32	44.5
Master Session	9	5	14

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

Methodologies

	Description
Troubleshooting and / or exercises	Resolution of problems or exercises of practical character and/or theorist exercises
Outdoor study / field practices	Visits to company/*s of the zone related with the design of *turbomáquinas hydraulic. They will realise in function of the availability or no of the companies
Practice in computer rooms	Practices of design of machines with software *Fluent
Tutored works	Works in group of design of components of Hydraulic Machines
Master Session	Classes in classroom

Personalized attention

Assessment

	Description	Qualification	Training and Learning Results	
Outdoor study / field practices	They will realise in function of the availability of the companies. In case of not being possible his realisation will carry out sessions of computer practices *evaluables by this 10%	10	C1 C9 C10 C16	D1 D3 D5 D11

Practice in computer rooms	It will evaluate the final practice realised by the student	10	C1 C9 C10 C16	D1 D3 D5 D11
Tutored works	It will evaluate the work realised on the design of the *MH assigned	80	C1 C9 C10 C16	D1 D3 D5 D11

Other comments on the Evaluation

The continuous evaluation represents 20% of the note, that will save for the second announcement and it will evaluate in the sessions of practices (10%) and in the assistance to the exit of study (10%) . 80% remaining will evaluate with a work in group of design of components/hydraulic machines. It is not necessary to take out a minimum note in each part to do the average of the *asignatura. The students to which have conceded them officially the renunciation to the Continuous Evaluation the work in group of design of components/hydraulic machines will have a weight of a 100% of the final qualification in the *asignatura. Second announcement: The continuous evaluation (20%) will save for the second announcement. 80% remaining will evaluate with a work of design of components/hydraulic machines. 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) considers that the student does not gather the necessary requirements to surpass the matter. In this case the global qualification in the current academic course will be of suspense (0.0).

Sources of information

Basic Bibliography

Viedma A., Zamora B., **Teoría y Problemas de máquinas hidráulicas**, 3ª Ed., Horacio Escarabajal Editores., 2008
Mataix, C., **Turbomáquinas Hidráulicas**, Editorial ICAI, 1975
Mataix, C., **Mecánica de Fluidos y Máquinas Hidráulicas**, Editorial del Castillo S.A., 1986

Complementary Bibliography

Hernández Krahe, J. M., **Mecánica de Fluidos y Máquinas Hidráulicas**, UNED, 1998
Creus, A., **Neumática e Hidráulica**., Marcombo Ed., 2011
Karassik, I. J., **Pump Handbook**., 2ª ed., Nueva York, McGraw-Hill., 1986
Krivchenko, G., **Hydraulic Machines: Turbines and Pumps**, 2ª ed., Lewis, 1994
Nechleba, M., **Hydraulic Turbines**, Constable, London, 1957

Recommendations