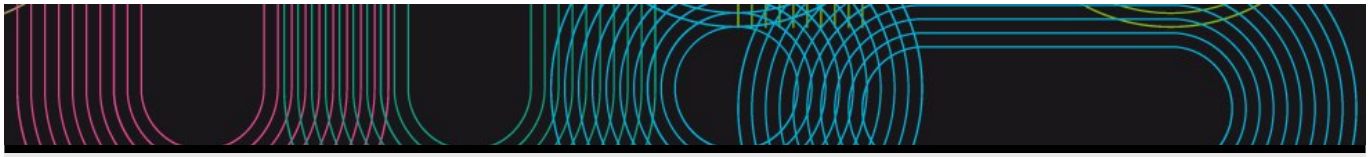

IDENTIFYING DATA				
Hydraulic turbomachines				
Subject	Hydraulic turbomachines			
Code	V12G360V01504			
Study programme	Grado en Ingeniería en Tecnologías Industriales			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Mandatory	3rd	1st
Teaching language				
Department				
Coordinator	Gil Pereira, Christian			
Lecturers	Gil Pereira, Christian Leite Herbello, Pablo			
E-mail	chgil@uvigo.es			
Web				
General description	The *asignatura *Turbomáquinas Hydraulic describes the operation of the group of machines that govern by the principle of Euler (machines *rotodinámicas). The knowledge of these machines provides the necessary basic principles to analyse the behaviour of the same in any installation in which they find , as well as the basic principles for his design and *dimensionado.			

Training and Learning Results	
Code	
B3	CG3 Knowledge in basic and technological subjects that will enable them to learn new methods and theories, and equip them with versatility to adapt to new situations.
C8	CE8 Knowledge of the basic principles of fluid mechanics and their application to solving problems in the field of engineering. Calculation of pipes, channels and fluid systems.
C25	CE25 Applied knowledge of the basics of fluidmechanics systems and machines.
D2	CT2 Problems resolution.
D9	CT9 Apply knowledge.
D10	CT10 Self learning and work.

Expected results from this subject	Training and Learning Results		
Purchase skills on the process of *dimensionado of installations of pumping and machines of fluids	B3	C8 C25	D2 D9 D10
To understand basic aspects of hydraulic machines	B3	C8 C25	D2 D9 D10

Contents	
Topic	
1.- Introduction	1.- Machines of Fluids. Classification 2.- *Turbomáquinas Hydraulic 3.- Applications to the Industry 4.-Characteristic general
2.- Transfer of Energy	1.- Equation of conservation of the energy 2.- Application to *Turbomáquinas 3.- Adimensional parameters and coefficients of speed 4.-Performances

3.- Similarity and characteristic Curves	1.- Similarity in *turbomáquinas 2.- Practical utilisation of the laws of similarity 3.- Comparison between *turbomáquinas 4.- Characteristic curves in hydraulic bombs 5. Characteristic curves in hydraulic turbines 6. Adimensional coefficients. Specific speed and specific power
4.- Transfer of Work	1.- Fundamental equation of the *Turbomáquinas. Equation of Euler. Distinct expressions of the equation of Euler 2.- One-dimensional ideal theory of *TMH 3.- Two-dimensional ideal theory of *TMH 4.- Real flow. Losses 5.- *Cavitación In *TMH
5.- Machines of fluids of despicable compressibility	1.-Classification 2.- Fans. Characteristic curves 3.- *Aerogeneradores. Classification - Theory of the disk actuator. Limit of *Betz - basic Concepts of aerodynamic profiles - Theory of the element of shovel - Curves of power
6.- Machines of positive trip and hydraulic transmissions	1.- Types and classification 2.- Alternative and rotatory bombs. 3.- Hydraulic engines of positive trip 4.- Transmissions and hydraulic attachments
Practices	1. Introduction to the pneumatic systems: - Description detailed of the pneumatic systems and his components. -Basic circuits. -Resolution of problems proposed 2. Resolution problems of *TMH 3. *Turbomáquinas -Test characterisation turbine Francis 4. Resolution of problems of *MDP

Planning			
	Class hours	Hours outside the classroom	Total hours
Lecturing	32	60	92
Laboratory practical	6	10	16
Problem solving	12	27	39
Essay questions exam	1	0	1
Essay questions exam	0.75	0	0.75
Essay questions exam	0.75	0	0.75
Essay questions exam	0.5	0	0.5
*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 theory *Traslación of technical problems to mathematical models.
Laboratory practical	Practices of pneumatic (see description in contents) Practices of *TH (see description in contents)
Problem solving	Technicians of design and calculation Presentation and interpretation of solutions.Practical cases

Personalized assistance	
Methodologies	**Description**
Problem solving	The professors will attend personally the doubts and queries of the students, so much in the classes as in the *tutorías.
Lecturing	The professors will attend personally the doubts and queries of the students, so much in the classes as in the *tutorías.
Laboratory practical	The professors will attend personally the doubts and queries of the students, so much in the classes as in the *tutorías.

Assessment

	Description	Qualification	Training and Learning Results		
Laboratory practical	Evaluation that will be able to include: - Resolution of problems - Reports of practical - practical Questions of oral form/written	10	B3	C8 C25	D9 D10
Essay questions exam	Proof written that it will be able to consist of: - theoretical Questions - practical Questions - Resolution of exercises/problems - Subject to develop	40	B3	C8 C25	D2 D9 D10
Essay questions exam	Partial proof written that it will be able to consist of: - practical theoretical/Questions - Resolution of exercises/problems - Subject to develop	20	B3	C8 C25	D2 D9 D10
Essay questions exam	Partial proof written that it will be able to consist of: - practical theoretical/Questions - Resolution of exercises/problems - Subject to develop	20	B3	C8 C25	D2 D9 D10
Essay questions exam	Partial proof written that it will be able to consist of: - practical theoretical/Questions - Resolution of exercises/problems - Subject to develop	10	B3	C8 C25	D2 D9 D10

Other comments on the Evaluation

Global assessment: in the two official editions the renunciation to the continuous and *elecciÃ*n of the system of *evaluaciÃ*n global makeÃ following the procedure and the term established by the centre. StateÃ of a Ã*nico examination written in the official date fixed by the School that *tendrÃ a weight of 100% of the note, and evaluateÃ*n all the contents youÃrich and *prÃ*cticos of the subject.

Ordinary call: Continuous assessment. consist of distinct proofs made during the subject and a final proof in the official date previously fixed by the centre. In this final proof demandÃ a note *mÃ*nima of 4 on 10 to be able to approve the subject. To approve, the final note have toÃ be, at least, of 5 on 10. In case of not reaching the note *mÃ*nima in the final examination, him awardÃ to the student a note of 4.5.

Extraordinary call: Continuous assessment. The student *podrÃ decide in the terms established if it keeps the note of the part *prÃ*ctica and partial proofs of the *evaluaciÃ*n continuous (60%), or if it renounces to her and opts by the *evaluaciÃ*n global. The proof makeÃ in the official date previously fixed by the centre. In this final proof demandÃ a note *mÃ*nima of 4 on 10 to be able to approve the subject. To approve, the final note have toÃ be, at least, of 5 on 10. In case of not reaching the note *mÃ*nima in the final examination, him awardÃ to the student a note of 4.5.

Behaviour Ã*tico: it expects that the present student a behaviour Ã*tico suitable, attending especially to the indicated in the *ArtÃ*culos 39, 40, 41 and 42 of the *Regulation on the *evaluaciÃ*n, the *calificaciÃ*n 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).

WARNING: In case of discrepancies between the distinct versions *lingÃÃ*sticas of the *guÃ*to prevailÃ the indicated in the *versiÃ*n in Spanish

Sources of information

Basic Bibliography

Viedma A., Zamora B., **Teoría y Problemas de máquinas hidráulicas**, 3º 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

Krivchenko, G, **Hydraulic Machines: Turbines and Pumps**, 2ª ed., Lewis, 1994

Creus, A., **Neumática e Hidráulica.**, Marcombo Ed., 2011

Karassik, I. J., **Pump Handbook**, 2ª ed., Nueva York, McGraw-Hill., 1986

Recommendations

Subjects that it is recommended to have taken before

Physics: Physics 1/V12G360V01102
Physics: Physics 2/V12G360V01202
Mathematics: Calculus 2 and differential equations/V12G360V01204
Fluid mechanics/V12G360V01403

Other comments

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 finds this matter.

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