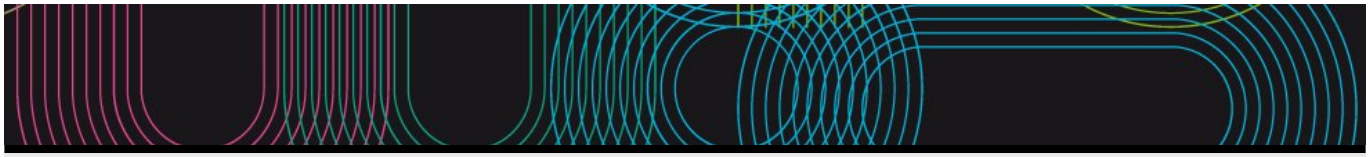

IDENTIFYING DATA				
Thermal Technology I				
Subject	Thermal Technology I			
Code	V04M141V01112			
Study programme	(*)Máster Universitario en Enxeñaría Industrial			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Optional	1st	1st
Teaching language	Spanish			
Department				
Coordinator	Pazo Prieto, José Antonio Cerdeira Pérez, Fernando			
Lecturers	Cerdeira Pérez, Fernando Pazo Prieto, José Antonio			
E-mail	nano@uvigo.es jpazo@uvigo.es			
Web	http://moovi.uvigo.gal/			
General description	In this subject pretends that the student purchase the essential knowledges that allow him comprise the operation of the thermal machines and the processes that take place in his interior, as well as that know the types of machines and installations more important and his components. His knowledge results basic for the analysis of the operation, design and construction of the thermal machines and of the thermal teams associated to the same, and in general the industrial applications of the thermal engineering.			

Skills	
Code	
A1	Knowledge and understanding that provide a basis or opportunity for originality in developing and / or applying ideas, often in a research context.
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.
C7	CET7. Apply their knowledge and solve problems in new or unfamiliar environments within broader contexts and multidisciplinary environments.
C17	CTI6. Knowledge and capabilities to understand, analyze, operate and manage the different sources of energy.

Learning outcomes	
Expected results from this subject	Training and Learning Results
(*)	A1 A2 C7 C17

Contents	
Topic	
Installations with cycle of steam and of gas.	Introduction to the thermal head offices. Main components. Cycles Rankine, Brayton and combined. Thermal balance. Thermal performance.
Study of the humid air.	Introduction. Variables psycrometrics. Diagrams psycometrics. Cooling towers.

Industrial fuels and his combustion.	Classification of the fuels. Properties of the fuels. Types of combustion.
Burners and boilers.	Definitions. Types of burners. Classification of boilers. Energetic balance. Performance.
Processes of spill.	Nozzles and diffusers.
Machines and thermal engines.	Generalities and fundamental processes. Classification. Components of the engines. Thermodynamic analysis. Characteristic parameters.
Pumping of heat.	Definitions. Cycle of Carnot reverse. Cycle of mechanical compression. Bomb of heat. Refrigeration by absorption.
Application of the renewable energies.	Thermal solar energy. Geothermal energy. Biomass and residual fuels.
Heat exchangers.	Introduction. Types of exchangers. Analysis of exchangers of heat. - Method DTLM - Method NTU

Planning

	Class hours	Hours outside the classroom	Total hours
Lecturing	18	20	38
Problem solving	12.5	24.5	37
Practices through ICT	4	4	8
Laboratory practical	15	5	20
Autonomous problem solving	0	20	20
Problem and/or exercise solving	2	0	2
Essay	0	15	15
Objective questions exam	2	8	10

*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 by part of the professor of the contents of the matter object of study.
Problem solving	Resolution of problems and/or exercises related with the subject that the student will make in classroom and/or laboratory. They will resolve problems of character "type" and/or practical examples.
Practices through ICT	Simulation of processes related with the content of the matter using specific software.
Laboratory practical	Experimentation of real processes in laboratory that complement the contents of the matter.
Autonomous problem solving	Resolution of problems and/or exercises related with the subject that the student will make out of the classroom.

Personalized assistance

Methodologies	Description
Lecturing	The doubts will resolve in the schedule of tutorials of face-to-face form or through the remote campus, if it proceeds.
Problem solving	The doubts will resolve in the schedule of tutorials of face-to-face form or through the remote campus, if it proceeds.

Assessment

	Description	Qualification	Training and Learning Results

Problem and/or exercise solving	Examination (writing, oral,...) consistent in the resolution of problems and/or relative questions to the contents of the matter developed so much in the sessions of theory as of practices. The examination will carry out in the dates fixed by the educational organisation of the centre, and will allow to reach the maximum note (10 points).	60	A1 A2	C7 C17
Essay	Individual works and/or in consistent group in the utilisation of specific software, resolution of practical cases,... Related with the contents of the matter. The realisation of these tasks will allow to reach until a maximum of 20% of the note.	20	A1 A2	C7 C17
Objective questions exam	During the course, the students will have to make different questionnaires composed by theoretical objective questions and/or of resolution of exercises related with the contents.	20	A1 A2	C7 C17

Other comments on the Evaluation

Sources of information

Basic Bibliography

Agüera Soriano, José, **Termodinámica lógica y motores térmicos**, Ciencia 3, D.L.,

Çengel Y.A.; Boles M.A., **Termodinámica**, McGraw-Hill-Interamericana,

Moran M.J.; Shapiro H.N., **Fundamentos de termodinámica técnica**, Editorial reverté, S.A.,

Incropera, Frank P., **Fundamentos de transferencia de calor**, Prentice Hall,

Complementary Bibliography

Múñoz Domínguez, M.; Rovira de Antonio, A.J., **Ingeniería Térmica**, UNED,

Potter M.C.; Somerton C.W., **Termodinámica para ingenieros**, McGraw-Hill/Interamericana de España, D.L.,

Recommendations

Contingency plan

Description

=== EXCEPTIONAL MEASURES SCHEDULED ===
In front of the uncertain and unpredictable evolution of the sanitary alert caused by the COVID-19, the University of Vigo establishes an extraordinary planning that will activate in the moment in that the administrations and the own institution determine it attending to criteria of security, health and responsibility, and guaranteeing the teaching in a no face-to-face stage or partially face-to-face. These already scheduled measures guarantee, in the moment that was prescriptive, the development of the teaching of a more agile and effective way when being known in advance by the students and the teacher through the tool normalised and institutionalised of the educational guides.

=== ADAPTATION OF THE METHODOLOGIES ===

* Educational Methodologies that modify
The classes of theory and problems will give of virtual or mixed form keeping the same contents with help of the remote campus and of the available means.
The classes of laboratory will give of virtual or mixed form with help of document cameras, videos, talks, software, ... Or those means that the professor consider adapted.

* Mechanism no face-to-face of attention to the students (tutorials)
The tutorials will attend by means of email and with the use of the virtual rooms of the professor or other systems.

* Modifications (if they proceed) of the contents to give
The contents keep .

* Additional bibliography to facilitate the car-learning
The bibliography keeps .

* Other modifications

=== ADAPTATION OF THE EVALUATION ===
* Test already made

* pending Proofs that keep
The proofs will make through the systems of tele-teaching available.

* Proofs that modify

* New proofs
does not proceed

* additional Information
The criteria of evaluation keep .