		Teaching Guide		
	Identifying D	Data		2019/20
Subject (*)	Heat transfer		Code	730G05022
Study programme	Grao en Enxeñaría Naval e Oceánica	a		'
		Descriptors		
Cycle	Period	Year	Туре	Credits
Graduate	1st four-month period	Third	Obligatory	4.5
Language	Spanish			
Teaching method	Face-to-face			
Prerequisites				
Department	Ciencias da Navegación e Enxeñaría	a MariñaConstrucións NavaisEr	nxeñaría Naval e Ind	ustrial
Coordinador	Lamas Galdo, Isabel	E-mail	isabel.lamas.ga	aldo@udc.es
Lecturers	Lamas Galdo, Isabel	E-mail	isabel.lamas.ga	aldo@udc.es
Web		·		
Seneral description	Heat transfer modes: conduction, con	nvection and radiation. Practica	l applications.	

Study programme competences / results
Study programme competences / results
(nowledge of the applied thermodynamics and of the transmission of the heat.
hat the students know how to apply its knowledge to its work or vocation in a professional way and possess the competences that tend to
rove itself by the elaboration and defense of arguments and the resolution of problems in its area of study
hat the students have the ability to bring together and to interpret relevant data (normally in its area of study) to emit judgments that
nclude a reflection on relevant subjects of social, scientific or ethical kind
hat the students can transmit information, ideas, problems and solutions to a public as much specialized as not specialized
hat the students developed those skills of learning necessary to start subsequent studies with a high degree of autonomy
Be able to carrying out a critical analysis, evaluation and synthesis of new and complex ideas.
Ising the basic tools of the technologies of the information and the communications (TIC) necessary for the exercise of its profession and
or the learning throughout its life.
Recognizing critically the knowledge, the technology and the available information to solve the problems that they must face.
The

Learning outcomes			
Learning outcomes	Stud	y progra	amme
	con	npetenc	es/
		results	
Know the basic concepts of heat transfer.	A14	B2	C1
Know the basics of the processes of conduction and convection of heat as a transport mechanism.		В3	C4
Know the basic concepts of heat transfer of external and internal flow of fluids for its application on fluid mechanics processes.		B4	
Know the operation of heat exchange equipment for industrial use to develop projects of some simple equipment.		B5	
		B6	

	Contents
Topic	Sub-topic
The following topics develop the contents indicated in the	Conduction
Verification Memory (Memoria de Verificacion), which are:	Convection
	Heat exchangers
1. Introduction	Introduction
	Heat transfer modes
	Conservation of energy

2. One-dimensional steady heat conduction	Introdution
	General heat conduction equation
	Cartesian coordinates
	Thermal contact resistance
	Cylindrical coordinates
	Spherical coordinates
	Fins
3. Numerical methods	Introduction
	Solution of the governing equations
4. Transient heat conduction	Lumped system analysys
	Semi-infinite solids
	Other cases
5. External forced convection	Introduction
	Flow across flat plates
	Flow across cylinders
	Flow across spheres
	Flow across tube banks
	Other cases
6. Internal forced convection	The entrance region
	Laminar flow
	Turbulent flow
	Non-circular tubes
	Distribution of temperature
7. Free convection	Introduction
	Vertical plates
	Inclined and horizontal plates
	Cylinders
	Spheres
8. Boiling and condensation	Boiling
	Condensation
9. Heat exchangers	Introduction
	DTML method
	Epsilon-NUT method
10. Radiation heat transfer	Fundamentals
	Radiation heat transfer

	Planning	g		
Methodologies / tests	Competencies /	Teaching hours	Student?s personal	Total hours
	Results	(in-person & virtual)	work hours	
Guest lecture / keynote speech	A14 B2 B3 B4 B5 B6	30	30	60
	C1 C4			
Mixed objective/subjective test	A14 B2 B3 B4 B5 B6	9.5	0	9.5
	C1 C4			
Problem solving	A14 B2 B3 B4 B5 B6	21	21	42
	C1 C4			
Personalized attention		1	0	1

	Methodologies
Methodologies	Description

Guest lecture /	Classes
keynote speech	
Mixed	Exam/s
objective/subjective	
test	
Problem solving	Students must deliver exercises

	Personalized attention
Methodologies	Description
Guest lecture /	Attention by tutorials and e-mail.
keynote speech	
Problem solving	Academic dispense is allowed. Students who request it must contact teacher to realize additional homework.
Mixed	
objective/subjective	
test	

		Assessment	
Methodologies	Competencies /	Description	Qualification
	Results		
Problem solving	A14 B2 B3 B4 B5 B6	Students must deliver exercises	20
	C1 C4		
Mixed	A14 B2 B3 B4 B5 B6	Exam/s	80
objective/subjective	C1 C4		
test			
Others			

## Assessment comments

## Students

who request academic dispense must realize other activities proposed by the

teacher. The qualification is the same as problem solving.

## The

evaluation criteria of the 2nd opportunity are the same as those of the 1st

opportunity except that, in case of partial exams, the mark obtained in these

will not be taken into account in the 2nd opportunity.

In order to pass it will be necessary to obtain at least 4 in the final exam and 5 in the global score.

	Sources of information
Basic	- Incropera, F. P.; DeWitt, D. P., (). Fundamentos de Transferencia de Calor y Materia. Pearson Eduación
	- Cengel, Y.A. (). Heat Transfer. A Practical Approach. McGraw-Hill
	- Sáiz Jabardo, J.M., Arce Ceinos, A., Lamas Galdo, M.I. (). Transferencia de Calor. Universidade da Coruña
	- Mills, A.F. (). Transferencia de Calor, 1ª Ed. Irwin
	- Holman, H.P. (). Transferencia de Calor. McGraw-Hill
Complementary	

si

Subjects that continue the syllabus

Graduation Project/730G03068

Other comments

To help achieve a

sustained immediate environment and meet the objective of action number 5:

"Healthy and sustainable environmental and social teaching and

research" of the "Green Campus Ferrol Action Plan":

&nbsp:&nbsp:&nbsp:&nbsp:&nbsp:&nbsp:&nbsp:&nbsp:&nbsp:

delivery of the documentary works that are made in this matter:

Will be requested in virtual format and / or computer support

It will be done through Moodle, in digital format without the need to print

them

If it is necessary to make them on paper:

Plastics will not be used

Double-sided prints will be made.

Recycled paper will be used.

Printing of drafts will be avoided.

A sustainable use of resources and the prevention of negative impacts on the

natural environment must be made

The importance of ethical principles related to the values ??of sustainability in personal and professional

behaviors must be taken into account

Gender perspective is incorporated into the teaching of this subject

(non-sexist language will be used, bibliography of authors of both sexes will

be used, intervention in class of students will be encouraged  $\ldots\!)$ 

Work will be done to identify and modify prejudices and sexist attitudes, and

the environment will be influenced to modify them and promote values ??of respect and equality.

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Discrimination situations must be detected and actions and measures will be

proposed to correct them.

(\*)The teaching guide is the document in which the URV publishes the information about all its courses. It is a public document and cannot be modified. Only in exceptional cases can it be revised by the competent agent or duly revised so that it is in line with current legislation.