

Teaching Guide				
	Identifyin	g Data		2022/23
Subject (*)	Heat transfer		Code	730G05022
Study programme	Grao en Enxeñaría Naval e Oceá	nica		
		Descriptors		
Cycle	Period	Year	Туре	Credits
Graduate	1st four-month period	Third	Obligatory	4.5
Language	Spanish			
Teaching method	Face-to-face	Face-to-face		
Prerequisites				
Department	Ciencias da Navegación e Enxeñaría MariñaEnxeñaría Naval e Industrial			
Coordinador	Arias Fernández, Ignacio E-mail ignacio.arias@udc.es			
Lecturers	Arias Fernández, Ignacio E-mail ignacio.arias@udc.es		udc.es	
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Web				
General description	Heat transfer modes: conduction, convection and radiation. Practical applications.			

	Study programme competences / results
Code	Study programme competences / results
A14	Knowledge of the applied thermodynamics and of the transmission of the heat.
B2	That the students know how to apply its knowledge to its work or vocation in a professional way and possess the competences that tend to
	prove itself by the elaboration and defense of arguments and the resolution of problems in its area of study
B3	That the students have the ability to bring together and to interpret relevant data (normally in its area of study) to emit judgments that
	include a reflection on relevant subjects of social, scientific or ethical kind
B4	That the students can transmit information, ideas, problems and solutions to a public as much specialized as not specialized
B5	That the students developed those skills of learning necessary to start subsequent studies with a high degree of autonomy
B6	Be able to carrying out a critical analysis, evaluation and synthesis of new and complex ideas.
C1	Using the basic tools of the technologies of the information and the communications (TIC) necessary for the exercise of its profession and
	for the learning throughout its life.
C4	Recognizing critically the knowledge, the technology and the available information to solve the problems that they must face.

Learning outcomes			
Learning outcomes		Study programme	
		competences /	
	results		
Know the basic concepts of heat transfer.		B2	C1
Know the basics of the processes of conduction and convection of heat as a transport mechanism.		B3	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		
Торіс	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

	Plannin	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
(*)The information in the planning table is fo	r guidance only and doos not	take into account the l	atorogonaity of the stur	lante

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

	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 will be provided by personalized attention, e-mail and Teams.	
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	30
	C1 C4		
Mixed	A14 B2 B3 B4 B5 B6	Exam/s	70
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 and extra opportunity are the same as those of the 1st
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 E		
	- 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		

Recommendations
Subjects that it is recommended to have taken before
Thermodynamics /730G03014
Subjects that are recommended to be taken simultaneously
Fluid Mechanisc /730G03018
Subjects that continue the syllabus



Graduation Project/730G03068		
Other comments		
To help achieve a		
sustained immediate environment and meet the object	ctive of action number 5:	
"Healthy and sustainable environmental and social te	eaching and	
research" of the "Green Campus Ferrol Action Plan":		
	psp; The	
delivery of the documentary works that are made in th	his matter:	
	psp; %nbsp;?	
Will be requested in virtual format and / or computer s	support	
&nb	psp; ?	
It will be done through Moodle, in digital format witho	ut the need to print	
them		
&nb	psp; %nbsp;?	
If it is necessary to make them on paper:		
&nb	psp; -	
Plastics will not be used		
&nb	psp; -	
Double-sided prints will be made.		
&nb	psp; -	
Recycled paper will be used.		
&nb	psp; -	
Printing of drafts will be avoided.		
&nb	<pre>>sp; </pre>	
A sustainable use of resources and the prevention of	i negative impacts on the	
natural environment must be made		
&nb	<pre>>sp; </pre>	
The importance of ethical principles related to the val	lues ??of sustainability in personal and professional	
behaviors must be taken into account		
&nb	psp; ?	
Gender perspective is incorporated into the teaching	of this subject	
(non-sexist language will be used, bibliography of aut	thors of both sexes will	
be used, intervention in class of students will be enco	buraged)	
&nb	psp; ?	
Work will be done to identify and modify prejudices a	nd sexist attitudes, and	
the environment will be influenced to modify them and	d promote values ??of respect and equality.	
	psp; %nbsp;?	
Discrimination situations must be detected and action	ns 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.