		Teaching Guide	!			
	Identifying	Data			2020/21	
Subject (*)	Heat transfer Code 7300			730G05022		
Study programme	Grao en Enxeñaría Naval e Oceánica					
		Descriptors				
Cycle	Period	Year		Туре	Credits	
Graduate	1st four-month period	Third		Obligatory	4.5	
Language	Spanish					
Teaching method	Hybrid					
Prerequisites						
Department	Ciencias da Navegación e Enxeña	ría MariñaEnxeñaría	Naval e Indu	ustrial		
Coordinador	Lamas Galdo, Isabel		E-mail	isabel.lamas.ga	ldo@udc.es	
Lecturers	Lamas Galdo, Isabel		E-mail	isabel.lamas.ga	ldo@udc.es	
Web				'		
General description	Heat transfer modes: conduction, of	onvection and radiati	on. Practica	l applications.		
Contingency plan	1. Modifications to the contents					
	No modifications.					
	2. Methodologies					
	*Teaching methodologies that are maintained					
	No modifications.					
	*Teaching methodologies that are	modified				
	No modifications.					
	3. Mechanisms for personalized attention to students					
	E-mail, moodle and teams. These	will be consulted ever	y dary.			
	4. Modifications in the evaluation					
	No modifications.					
	*Evaluation observations:					
	*Evaluation observations:  The exams will take place online.					
	THE EXAMS WIII LAKE PLACE OF INTE.					
	5 Modifications to the hibliography	or webaranhy				
	5. Modifications to the bibliography or webgraphy No modifications.					
	INO MOUMICATIONS.					
	T. Control of the Con					

	Study programme competences
Code	Study programme competences
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
В3	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
В6	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		amme
		competences	
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	
		В6	

	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			
tests Competencies		Student?s personal	Total hours
	hours	work hours	
A14 B2 B3 B4 B5 B6	30	30	60
C1 C4			
A14 B2 B3 B4 B5 B6	9.5	0	9.5
C4 C1			
A14 B2 B3 B4 B5 B6	21	21	42
C1 C4			
	1	0	1
	Competencies  A14 B2 B3 B4 B5 B6 C1 C4 A14 B2 B3 B4 B5 B6 C4 C1 A14 B2 B3 B4 B5 B6	hours  A14 B2 B3 B4 B5 B6 30  C1 C4  A14 B2 B3 B4 B5 B6 9.5  C4 C1  A14 B2 B3 B4 B5 B6 21	Competencies         Ordinary class hours         Student?s personal work hours           A14 B2 B3 B4 B5 B6         30         30           C1 C4         A14 B2 B3 B4 B5 B6         9.5         0           C4 C1         A14 B2 B3 B4 B5 B6         21         21           C1 C4         C1 C4         C1 C4         C1 C4

	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
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	C4 C1		
test			
Others			

Assessment comments	
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## 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	

	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 objective of action number 5:

"Healthy and sustainable environmental and social teaching and

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

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:

.anbsp;

Plastics will not be used

Double-sided prints will be made.

Recycled paper will be used.

 $\ \&nbs$ 

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

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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 ...)

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.

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.