Teaching Guide					
Identifying Data					2021/22
Subject (*)	Termomecanics of Materials Properties. Advanced Methods			Code	730495004
Study programme	Mestrado Universitario en Materiais Complexos: Análise Térmica e Reoloxía (plan 2012)				
Descriptors					
Cycle	Period	Year		Type	Credits
Official Master's Degree	2nd four-month period	First		Obligatory	3
Language	English				
Teaching method	Face-to-face				
Prerequisites					
Department	Enxeñaría Naval e Industrial				
Coordinador	López Beceiro, Jorge José		E-mail	jorge.lopez.beceiro@udc.es	
Lecturers	Artiaga Diaz, Ramon Pedro López Beceiro, Jorge José		E-mail	ramon.artiaga@udc.es jorge.lopez.beceiro@udc.es	
Web	http://eps.udc.es/diderot				
General description	Following the previous subject (Fundamentals Methods), the objective is to deepen the study of the thermal properties describing the overlay charts time / temperature, methods of analyzes modulated to separate different thermal processes (glass transition, relaxation enthalpy).				

Contingency plan	1. Modifications in the contents. The content is not modified. 2. Methodologies * Teaching methodologies that are maintained Master session (through teams) Tutored works (tutored by teams or email) Objective test (online) * Teaching methodologies that change Laboratory practice. It is replaced by the presentation of practical cases in the master sessions and the reading and discussion of scientific articles (analysis of documentary sources). 3. Mechanisms for personalized attention to students. - E-mail: every day. Useful for making queries, requesting virtual meetings to resolve doubts and following up on supervised work. - Microsoft Teams: personalized student tutoring - Moodle: will be used as a repository for documentation provided to students. 1. Modificaciones en los contenidos 2. Metodologías *Metodologías docentes que se mantienen *Metodologías docentes que se modifican 3. Mecanismos de atención personalizada al alumnado 4. Modificacines en la evaluación *Observaciones de evaluación: 5. Modificaciones de la bibliografía o webgrafía 4. Modifications in the evaluation. Master session 10% - Continuous assessment through evaluation of active participation and with use. Mentored work 60% - Presentation of supervised work. Objective test 20% - Presentation of supervised work will be done orally. Analysis of documentary sources 10% - Reading and discussion of articles in scientific journals related to the firm * Evaluation observations: - 5. Modifications to the bibliography or webography

No modifications

Study programme competences / results	
Code	Study programme competences / results
A1	Set up and conduct tests using the techniques of thermal analysis and rheology most appropriate in each case, within the scope of complex materials
A2	Identify and evaluate the different types of complex materials
B1	Knowledge and understanding to provide a basis or opportunity for originality in developing and / or applying ideas, often in a research context
B2	The students have the skill to apply their knowledge and their ability to solve problems in new or unfamiliar contexts within broader (or multidisciplinary) contexts related to their field of study
B4	That the students can communicate their conclusions and the knowledge and last reasons behind that conclusions to specialized and non specialized audience in a clear and unambiguous way
B5	That students possess learning skills to enable them to continue studying in a way that will be largely self-directed or autonomous.
B6	Learning to learn
B8	Applying a critical, logical and creative way of thinking
B13	Analysis-oriented attitude
B21	To assess the importance of research, innovation and technological developments in the socio-economic and cultural progress of society
C2	Have a good command of spoken and writing expression and understanding of a foreign language.
C3	Using the basic tools of information technology and communications (ICT) necessary for the exercise of their profession and for learning throughout his life.
C6	Critically assessing the knowledge, technology and information available to solve the problems they face with.
C7	To assume as a professional and citizen the importance of learning throughout life.
C8	To assess the importance of research, innovation and technological development in the socio-economic and cultural progress of society.
C9	Appreciate the importance of research in environmental protection

Learning outcomes			
Learning outcomes	Study programme competences / results		
Correctly set up the tests	AR1	BR1 BR2 BR4 BR8 BR13 BR21	CR2 CR3 CR6 CR7 CR8
To know the different possibilities of separating overlapping process	AR1 AR2	BR2 BR4 BR5 BR6 BR8 BR13	CR2 CR3 CR6 CR7 CR8 CR9

Contents	
Topic	Sub-topic
The glass transition and the enthalpic relaxation	The glass transition. Erasing thermal history. Effect of annealing below the Tg. Problem of overlapping glass transition and enthalpic relaxation.
Diagrams TTT	Measuring the gelation Measuring the vitrification Construction and meaning of the TTT diagrams.

Separating overlapped processes by thermal-modulated methods	Reversibility as function of observation time Study of the glass transition by dynamic techniques Separation of overlapping processes

Planning				
Methodologies / tests	Competencies / Results	Teaching hours (in-person & virtual)	Student?s personal work hours	Total hours
Guest lecture / keynote speech	A1 A2 B1 B2 B5 B13 B21 C7 C8 C9	8	12	20
Laboratory practice	A1 B1 B6 B8 B13	8	24	32
Supervised projects	A1 A2 B1 B2 B4 B6 B13 C2 C3 C6 C8 C9	2	18	20
Objective test	A1 A2 B2 B4 B13 B21 C2	1	0	1
Personalized attention		2	0	2
(*)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 / keynote speech	Presentation given by the professor, on a schematic basis, focusing on the main topics, covering both theoretical and practical issues.
Laboratory practice	Performance of practical activities such as demonstrations, exercises, experiments, etc..
Supervised projects	Activities whose purpose is that the students enlarge the study of the topics pesented in the program and consolidate their acquired knowledge and capabilities. These activities should also help the students learn and improve their capabilities in literature survey.
Objective test	Exam that will help to evaluate the knowledge and competencies acquired by the students.

Personalized attention	
Methodologies	Description
Supervised projects Guest lecture / keynote speech Laboratory practice Objective test	The personalized attention to students, understood as a support in the teaching-learning process, will take place in the hours of tutoring of the teacher. No academic dispensation is accepted.

Assessment			
Methodologies	Competencies / Results	Description	**Qualification**
Supervised projects	A1 A2 B1 B2 B4 B6 B13 C2 C3 C6 C8 C9	Presentation (oral and written) of the supervised work.	60
Guest lecture / keynote speech	A1 A2 B1 B2 B5 B13 B21 C7 C8 C9	Continuous assessment through monitoring of student work in the classroom, laboratory and / or tutorials.	10
Laboratory practice	A1 B1 B6 B8 B13	Continuous assessment through monitoring of student work in the classroom, laboratory and / or tutorials.	10
Objective test	A1 A2 B2 B4 B13 B21 C2	Examination or objective test.	20

Assessment comments
Academic waiver is not accepted. The evaluation criteria for the second opportunity and the extraordinary opportunity are the same as for the first opportunity.

Sources of information	
Basic	Mechanical properties of polymers and composites / Lawrence E. Nielsen, Robert F. Landel Nielsen, Lawrence E. Esc Politécnica Superior -- CM P 154 -- Thermal analysis. Fundamentals and applications to material characterization: proceedings of the international seminar: Thermal analysis and rheology. Ferrol, Spain, 30 Juny-4 July, 2003 / Ramón Artiaga Díaz (ed.), A Coruña: Universidade da Coruña, Servicio de Publicacions, 2005, ISBN 84-9749-100-9Thermal analysis of polymers / edited by Joseph D. Menczel, R. Bruce Prime; Hoboken, N.J.: John Wiley, [2009], ISBN 978-0-471-76917-0Handbook of thermal analysis of construction materials / by V.S. Ramachandran ... [et al.]. Norwich (New York): Noyes Publications/William Andrew Pub., [2003], ISBN 0-8155-1487-5Handbook of thermal analysis and calorimetry. Volume 2, Applications to inorganic and miscellaneous materials / edited by Michael E. Brown, Patrick K. Gallagher, Amsterdam: Elsevier, 2003, ISBN 0-444-82086-8Modulated temperature differential scanning calorimetry : theoretical and practical applications in polymer characterisation / edited by Mike Reading and Douglas J. Hourston, Dordrecht : Springer, [2006] ? ISBN 978-1-4020-3749-XHandbook of thermal analysis and calorimetry. Volume 5, Recent advances, techniques and applications / edited by Michael E. Brown, Patrick K. Gallagher, Amsterdam : Elsevier, 2008 - 978-0-444-53123-0
Complementary	

Recommendations
Subjects that it is recommended to have taken before
Subjects that are recommended to be taken simultaneously
Thermo-mechanical properties of materials. Fundamental Methods/730495003
Subjects that continue the syllabus
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":The delivery of the documentary work carried out in this subject:They will be requested in virtual format and/or computer supportIt will be done through Moodle, in digital format without the need to print them.If it is necessary to make them on paper:Plastics shall not be usedDouble-sided priing shall be carried out.Recycled paper will be used.Printing of drafts shall be avoided.A sustainable use of resources and the prevention of negative impacts on the natural environment must be made.

(*)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.