



Teaching Guide

| Identifying Data | | | | | 2015/16 |
|--------------------------|---|-------|-------------|--|---------|
| Subject (*) | Viscoelasticidade de materiais | | Code | 730495002 | |
| 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 | Obligatoria | 3 | |
| Language | English | | | | |
| Teaching method | Face-to-face | | | | |
| Prerequisites | | | | | |
| Department | Enxeñaría Industrial 2 | | | | |
| Coordinador | Artiaga Diaz, Ramon Pedro | | E-mail | ramon.artiaga@udc.es | |
| Lecturers | Artiaga Diaz, Ramon Pedro López Beceiro, Jorge José | | E-mail | ramon.artiaga@udc.es jorge.lopez.beceiro@udc.es | |
| Web | | | | | |
| General description | | | | | |

Study programme competences

| Code | Study programme competences |
|------|---|
| 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 |
| 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 |
| 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. |
| 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. |

Learning outcomes

| Learning outcomes | Study programme competences | | |
|---|-----------------------------|----------------------------|-------------------|
| Determining what type of rheometer is appropriate depending on the material | AR2 | BR2 BR8 BR13 BR21 | CR6 CR7 |
| To distinguish between different viscoelastic behavior. | AR2 | BR4 BR8 BR13 BR21 | CR2 CR6 CR7 |
| Properly set up the test conditions. | AR1 AR2 | BR2 BR8 BR13 | |

Contents

| Topic | Sub-topic |
|-------|-----------|
| | |



| | |
|--|--|
| Linear and nonlinear viscoelasticity | Ideal elastic and viscous behavior. Viscoelastic behavior of the materials. Range of linearity. |
| Choosing the most appropriate rheometer | Stress control rheometers. Deformation control rheometers. Geometric configurations. Parameters affecting the choice of the rheometer. |
| Experimental setup depending on the material | Geometric configurations. Stationary and dynamic tests. Determination of the ranges of linearity in frequency, amplitude and temperature. Choice and optimization of experimental parameters. |

| Planning | | | | |
|--------------------------------|---------------------------------|----------------------|-------------------------------|-------------|
| Methodologies / tests | Competencies | Ordinary class hours | Student?s personal work hours | Total hours |
| Guest lecture / keynote speech | A1 A2 B21 C6 C7 | 10 | 10 | 20 |
| Laboratory practice | A1 B2 B8 B13 | 15 | 9 | 24 |
| Supervised projects | A1 A2 B2 B4 B8 B13 B21 C2 C6 | 2.5 | 22.5 | 25 |
| Objective test | A1 A2 B2 B4 B8 B13 C2 | 1 | 0 | 1 |
| Personalized attention | | 5 | 0 | 5 |

(*)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, research, etc.. |
| Supervised projects | Activities whose purpose is that the students enlarge the study of ther topics pesented in each theme and consolidate their acquired knowledge and capabilities. These activities should aslo 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 |
| Guest lecture / keynote speech Laboratory practice Supervised projects 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. |

| Assessment | | | |
|--------------------------------|-----------------|--|---------------|
| Methodologies | Competencies | Description | Qualification |
| Guest lecture / keynote speech | A1 A2 B21 C6 C7 | Continuous assessment through monitoring of student work in the classroom, laboratory and / or tutorials | 10 |
| Laboratory practice | A1 B2 B8 B13 | Continuous assessment through monitoring of student work in the classroom, laboratory and / or tutorials | 10 |



| | | | |
|---------------------|---------------------------------|--|----|
| Supervised projects | A1 A2 B2 B4 B8 B13 B21 C2 C6 | Activities whose purpose is that the students enlarge the study of their topics presented in each theme and consolidate their acquired knowledge and capabilities. These activities should also help the students learn and improve their capabilities in literature survey. | 60 |
| Objective test | A1 A2 B2 B4 B8 B13 C2 | Examination or objective test. | 20 |

Assessment comments

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Sources of information

| | |
|----------------------|--|
| Basic | <p>O sistema de Biblioteca da UDC permite realizar búsquedas de literatura recomendada por profesor e material. Esta é unha lista ampliada das fontes recomendadas: Estudo reolóxico de betumes asfálticos [Recurso electrónico] / Jesús López Paz ; tutores Ramón Pedro Artiaga Díaz, Jorge José López Beceiro López Paz, Jesús Esc Politécnica Superior Depósito -- RP I 429 -- DISPOÑIBLE Understanding polymer processing : processes and governing equations Osswald, Tim A. Esc Politécnica Superior Depósito -- CM P 155 -- VENCE 05-06-15 Understanding rheology Morrison, Faith A. Esc Politécnica Superior Depósito -- CM 357 -- DISPOÑIBLE 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 84-9749-100-9 Thermal analysis of polymers / edited by Joseph D. Menczel, R. Bruce Prime; Hoboken, N.J.: John Wiley, [2009], ISBN 978-0-471-76917-0 Menard, Kevin P., Dynamic mechanical analysis A practical introduction, Boca Raton : CRC Press, [1999], ISBN 0-8493-8688-8 Ward, Ian Macmillan. An introduction to the mechanical properties of solid polymers / I.M. Ward, and J. Sweeney, Chichester, England : John Wiley & Sons, [2004] 2nd ed. ISBN 0-471-49625-1 Relaxation phenomena in polymers / edited by Shiro Matsuoka. Munich ; New York : Hanser Publishers ; New York : Distributed in the U.S.A. and Canada by Oxford University Press, 1992. ISBN 3-446-17111-8 (Hanser), 0-19-520957-5 (Oxford University Press)</p> |
| Complementary | |

Recommendations

Subjects that it is recommended to have taken before

Subjects that are recommended to be taken simultaneously

Subjects that continue the syllabus

Other comments

(*)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.