| Teaching Guide | | | | |
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| Identifying Data | | | | 2017/18 |
| Subject (*) | Applications to environmental protection | | Code | 730495006 |
| 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 Naval e Industrial | | | |
| Coordinador | López Beceiro, Jorge José | E-mail | jorge.lopez.beceiro@udc.es | |
| Lecturers | Artiaga Diaz, Ramon Pedro<br>López Beceiro, Jorge José | E-mail | ramon.artiaga@udc.es<br>jorge.lopez.beceiro@udc.es | |
| Web | http://complexmaterials.wikispaces.com | | | |
| General description | Analysis using different experimental techniques gases emitted / absorbed in different processes. Substituting synthetic polymers biopolymers. Value the study of waste minimization / elimination. | | | |

| 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 |
| A6 | Understanding the importance of the environment and of the research focused on the elimination/minimization of final or process wastes |
| 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 |
| B7 | Solving problems effectively |
| B8 | Applying a critical, logical and creative way of thinking |
| B11 | Behave with ethics and social responsibility as a citizen and as a professional |
| B14 | Ability to find and manage the information |
| B21 | To assess the importance of research, innovation and technological developments in the socio-economic and cultural progress of society |
| B22 | Understand the importance of protecting the environment |
| C2 | Have a good command of spoken and writing expression and understanding of a foreign language. |
| C4 | Developing for the exercise of an open, educated, critical, committed, democratic and solidary citicenship, able to analyze reality, diagnose problems, formulate and implement solutions based on knowledge and oriented to the common good. |
| C7 | To assume as a professional and citizen the importance of learning throughout life. |
| C9 | Appreciate the importance of research in environmental protection |

| Learning outcomes | |
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| Learning outcomes | Study programme competences / results |

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|---|---|---|---|
| Ability to analyze using different experimental techniques gases emitted / absorbed in different processes | AR1<br>AR6 | BR1<br>BR2<br>BR4<br>BR7<br>BR8<br>BR11<br>BR14<br>BR21<br>BR22 | CR2<br>CR4<br>CR7<br>CR9 |
| Recognize the importance of replacing synthetic polymers for biopolymers | AR6 | BR1<br>BR2<br>BR4<br>BR7<br>BR8<br>BR11<br>BR14<br>BR21<br>BR22 | CR2<br>CR4<br>CR7<br>CR9 |
| Appreciating the study of waste for minimization / elimination | AR6 | BR1<br>BR2<br>BR4<br>BR7<br>BR8<br>BR11<br>BR14<br>BR21<br>BR22 | CR2<br>CR4<br>CR7<br>CR9 |

| Contents | |
|---|---|
| **Topic** | **Sub-topic** |
| Analysis of the combustion gases by TG-FTIR | Degradation in oxidizing and inert atmosphere<br>Products of combustion<br>Component Identification by FTIR |
| Evaluation of the absorption of harmful gases by TG | Characteristics of absorbent substrates<br>Influence of absortion temperature<br>Influence of concentration and gas flow<br>Setting up an experiment to evaluate the absorption of gases |
| Rheology of fuel marine waste | General characteristics of fuel marine waste<br>Rheological properties of interest<br>Thermal and rheological characterization |
| Substitution of synthetic polymers by biopolymers | Methods for obtaining biopolymers<br>Main biopolymers<br>Compared to synthetic polymers<br>Possibilities and prospects of replacing synthetic polymers for biopolymers |

| Planning | | | | |
|---|---|---|---|---|
| **Methodologies / tests** | **Competencies / Results** | **Teaching hours (in-person & virtual)** | **Student?s personal work hours** | **Total hours** |
| Guest lecture / keynote speech | A6 B1 B11 B21 B22 C4 C9 | 10 | 10 | 20 |

| | | | | |
|---|---|---|---|---|
| Laboratory practice | A1 B2 B7 C7 | 15 | 9 | 24 |
| Supervised projects | A1 B2 B4 B7 B8 B11 B14 B21 C2 | 2.5 | 22.5 | 25 |
| Objective test | A6 B4 B8 C2 C9 | 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 | |
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| **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** |
| Objective test<br>Guest lecture / keynote speech<br>Laboratory practice<br>Supervised projects | The personalized attention to students, understood as a support in the teaching-learning process, will take place in the hours of tutoring of the professor. |

| Assessment | | | |
|---|---|---|---|
| **Methodologies** | **Competencies / Results** | **Description** | **Qualification** |
| Objective test | A6 B4 B8 C2 C9 | Examination or objective test. | 20 |
| Guest lecture / keynote speech | A6 B1 B11 B21 B22 C4 C9 | Continuous assessment through monitoring of student work in the classroom, laboratory and / or tutorials. | 10 |
| Laboratory practice | A1 B2 B7 C7 | Continuous assessment through monitoring of student work in the classroom, laboratory and / or tutorials. | 10 |
| Supervised projects | A1 B2 B4 B7 B8 B11 B14 B21 C2 | Presentation (oral and written) of the supervised work. | 60 |

| Assessment comments |
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| Sources of information | |
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| **Basic** | In this subject you work with different scientific articles from journals or Ph D thesis such as:Estudio térmico de maderas [Recurso electrónico] / autora, María Teresa Sebio Puñal ; directores, Ramón Pedro Artiaga Díaz [y] Salvador Naya Fernández. Sebio Puñal, María Teresa. Biblioteca central -- TE.UDC-433 CD-ROM -- Journal of Thermal Analysis and Calorimetry Energy Conversion and Management Thermochimica Acta Energy & Fuels Environmental Research Letters ... The papers will be related to analytical techniques studied and the environment. |
| **Complementary** | |

| Recommendations |
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| **Subjects that it is recommended to have taken before** |

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| Physical-chemistry of polymers/730495011 |
| **Subjects that are recommended to be taken simultaneously** |
| Introduction to complex materials/730495001<br>Vicoelasticity of materials/730495002<br>Thermo-mechanical properties of materials. Fundamental Methods/730495003 |
| **Subjects that continue the syllabus** |
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| **Other comments** |
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**(*)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.**