



**Teaching Guide**

| Identifying Data           |  |               |                                    |                | 2017/18 |
|----------------------------|--|---------------|------------------------------------|----------------|---------|
| <b>Subject (*)</b>         | Structured materials. Nanomaterials  |               | <b>Code</b>                        | 730495010      |         |
| <b>Study programme</b>     | Mestrado Universitario en Materiais Complexos: Análise Térmica e Reoloxía (plan 2012)  |               |                                    |                |         |
| Descriptors                |  |               |                                    |                |         |
| <b>Cycle</b>               | <b>Period</b>  | <b>Year</b>   | <b>Type</b>                        | <b>Credits</b> |         |
| Official Master's Degree   | 1st four-month period  | First         | Obligatoria                        | 3              |         |
| <b>Language</b>            | English  |               |                                    |                |         |
| <b>Teaching method</b>     | Face-to-face   |               |                                    |                |         |
| <b>Prerequisites</b>       |  |               |                                    |                |         |
| <b>Department</b>          |  |               |                                    |                |         |
| <b>Coordinador</b>         | López Beceiro, Jorge José  | <b>E-mail</b> | jorge.lopez.beceiro@udc.es         |                |         |
| <b>Lecturers</b>           | Carn , Florent   | <b>E-mail</b> | florent.carn@univ-paris-diderot.fr |                |         |
| <b>Web</b>                 |  |               |                                    |                |         |
| <b>General description</b> | <p>This course introduces the latest strategies for structuring hard materials (nanoparticles, nanocomposites, porous monoliths hierarchically) by complex fluids. Complex fluids normally considered: solutions of large molecules (eg polymers) or supramolecular structures (eg, micelles ...) in ordinary liquids, foams or emulsions. The aim of this course is to illustrate the physical form of complex fluids and concepts that can be applied to the rational design of advanced materials. Emphasis will be placed for each system, in: the structure / properties of the final solid materials; the structure and stability of complex fluids and some specific characterization techniques are presented.</p> |               |                                    |                |         |

**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   |
| A5   | Understanding the relationships between structure and properties of 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             |
| B13  | Analysis-oriented attitude  |
| B14  | Ability to find and manage the information  |
| B17  | Analyze and decompose processes   |
| B18  | Ability for abstraction, understanding and simplification of complex problems   |
| 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.   |
| 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.  |

**Learning outcomes**

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



|  |     |      |     |
|--|-----|------|-----|
| <p>This course introduces recent strategies for structuring hard materials (nanoparticles, nanocomposites and hierarchically porous monoliths) by complex fluids. Complex fluids that are typically considered: solutions of large molecules (eg polymers.) Or supramolecular structures (eg micelles..) In ordinary liquids, foams or emulsions. The aim of this course is to illustrate how complex physical concepts of fluid can be applied to the rational design of advanced materials. For each system, the emphasis will be on: structure / properties of the final solid materials; the structure and stability of the complex fluids. Some specific characterization techniques presented.</p> | AR1 | BR1  | CR2 |
|  | AR5 | BR2  | CR6 |
|  |     | BR4  | CR7 |
|  |     | BR13 | CR8 |
|  |     | BR14 |     |
|  |     | BR17 |     |
|  |     | BR18 |     |
|  |     | BR21 |     |
|  |     | BR22 |     |

| Contents                                      |   |
|---|---|
| Topic   | Sub-topic                                 |
| 1. Fundamentals of physicochemical Interfaces | Fundamentos físico químicos de interfases |
| 2. Solid hierarchically porous                | Sólidos xerárquicamente porosos           |
| 3. Nanoparticles                              | Nanopartículas                            |
| 4. Nanocomposites                             | Materiais nanocompostos                   |
| 5. Biogels                                    | Bioxeles                                  |

| Planning                       |                               |                                      |                               |             |
|--------------------------------|-------------------------------|--------------------------------------|-------------------------------|-------------|
| Methodologies / tests          | Competencies / Results        | Teaching hours (in-person & virtual) | Student?s personal work hours | Total hours |
| Guest lecture / keynote speech | A1 A5 B14                     | 12.5                                 | 12.5                          | 25          |
| Laboratory practice            | A1 B2 B17 B18 C8              | 20                                   | 4                             | 24          |
| Supervised projects            | B1 B4 B13 B21 B22<br>C2 C6 C7 | 4                                    | 20                            | 24          |
| 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 presented 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. |

| Personalized attention   |  |
|--|--|
| Methodologies  | Description  |
| 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 |
| Guest lecture / keynote speech | A1 A5 B14              | Continuous assessment through monitoring of student work in the classroom, laboratory and / or tutorials. | 50            |



|                     |                               |   |    |
|---------------------|-------------------------------|---|----|
| Laboratory practice | A1 B2 B17 B18 C8              | Continuous assessment through monitoring of student work in the classroom, laboratory and / or tutorials. | 20 |
| Supervised projects | B1 B4 B13 B21 B22<br>C2 C6 C7 | Presentation (oral and written) of the supervised work.   | 30 |

#### Assessment comments

#### Sources of information

Basic

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.