



Teaching Guide

| Identifying Data | | | | | 2020/21 |
|--------------------------|--|--------|-----------------------------------|-----------|---------|
| Subject (*) | Mechanics of continuous media | | Code | 730495014 | |
| Study programme | Mestrado Universitario en Materiais Complexos: Análise Térmica e Reoloxía (plan 2012) | | | | |
| Descriptors | | | | | |
| Cycle | Period | Year | Type | Credits | |
| Official Master's Degree | 1st four-month period | First | Optional | 4 | |
| Language | English | | | | |
| Teaching method | Face-to-face | | | | |
| Prerequisites | | | | | |
| Department | | | | | |
| Coordinador | Derr , Julien | E-mail | julien.derr@univ-paris-diderot.fr | | |
| Lecturers | Derr , Julien | E-mail | julien.derr@univ-paris-diderot.fr | | |
| Web | | | | | |
| General description | The course provides a thorough treatment of the continuum mechanics for liquids and solids. It is to present the different mechanical behavior of matter in the continuum limit by applying Newton's laws of motion to the solid materials (elasticity) and fluid behavior. | | | | |
| Contingency plan | <p>1. Modifications to the contents</p> <p>The contents are not modified</p> <p>2. Methodologies</p> <p>*Teaching methodologies that are maintained</p> <p>Guest lecture/keynote speech (via Teams)</p> <p>Supervised projects (tutored via Teams or email)</p> <p>*Teaching methodologies that are modified</p> <p>Laboratory practice. It is replaced by the presentation of practical cases in the Keynote sessions and the reading and discussion of scientific articles (analysis of documentary sources).</p> <p>3. Mechanisms for personalized attention to students</p> <ul style="list-style-type: none"> - Email: Daily. Used to make queries, request virtual meetings to resolve doubts and monitor the work being supervised. - Microsoft Teams: Personalized tutoring of students - Moodle: This will be used as a repository for documentation provided to students. <p>4. Modifications in the evaluation</p> <p>Keynote Sessions 60%</p> <p>Supervised projects 30%</p> <p>Analysis of documentary sources 10%</p> <p>*Evaluation observations: -</p> <p>5. Modifications to the bibliography or webgraphy</p> <p>No change.</p> | | | | |

Study programme competences / results

| Code | Study programme competences / results |
|------|--|
| A5 | Understanding the relationships between structure and properties of materials |
| A7 | Knowing the different types of thermal thermo-mechanical behaviors in materials subjected to fatigue |



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|-----|---|
| 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 |
| B8 | Applying a critical, logical and creative way of thinking |
| B9 | To work autonomously with initiative |
| B13 | Analysis-oriented attitude |
| 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 |
| 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 | | |
| The course provides a thorough treatment of the mechanics of continuous media for fluids and solids. The aim is to present the different mechanical behavior of matter in the continuous limit. Newton's laws of motion in media with strong performance (elasticity) and / or fluid is applied. | AR5 AR7 | BR1 BR2 BR4 BR8 BR9 BR13 BR14 BR21 | CR2 CR6 CR7 CR8 |

| Contents | |
|---|-----------|
| Topic | Sub-topic |
| 1. Introduction to elastic modulus (Young's modulus, shear modulus, bulk modulus, ...) of a solid and a fluid viscosities | |
| 2. Description of the displacement field in an elastic body, and velocity field in a fluid | |
| 3. Expression of elastic energy in linear elasticity, and the rate of viscous fluid in dedisipación | |
| 4. Description of the different apparatus for measuring or viscous elastic properties (or both) of a medium. | |

| Planning | | | | |
|--------------------------------|---------------------------|--------------------------------------|-------------------------------|-------------|
| Methodologies / tests | Competencies / Results | Teaching hours (in-person & virtual) | Student?s personal work hours | Total hours |
| Guest lecture / keynote speech | A5 A7 B1 B9 B14 B21 | 10 | 18 | 28 |
| Laboratory practice | B2 B4 B8 B13 C8 | 20 | 20 | 40 |
| Supervised projects | B9 B13 B14 C2 C6 C7 C8 | 5 | 25 | 30 |
| 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 | 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. No academic dispensation is accepted. |

| Assessment | | | |
|--------------------------------|------------------------|---|---------------|
| Methodologies | Competencies / Results | Description | Qualification |
| Guest lecture / keynote speech | A5 A7 B1 B9 B14 B21 | Examination or objective test. | 50 |
| Laboratory practice | B2 B4 B8 B13 C8 | Continuous assessment through monitoring of student work in the classroom, laboratory and / or tutorials. | 20 |
| Supervised projects | B9 B13 B14 C2 C6 C7 C8 | Presentation (oral and written) of the supervised work. | 30 |

| Assessment comments |
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| Sources of information | |
|------------------------|--|
| Basic | Apuntes e documentación facilitada en clase ou a través do correo electrónico. |
| Complementary | - David J. Raymond (1999). Introduction to Continuum Mechanics. http://kestrel.nmt.edu/~raymond/classes/ph536/continuum.pdf - Basile Audoly, Yves Pomeau (2010). Elasticity and Geometry: From hair curls to the nonlinear response of shells. Oxford University Press - GK Batchelor (2012). An Introduction to Fluid Dynamics. Cambridge University Press |

| Recommendations |
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| Subjects that it is recommended to have taken before |
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| Subjects that are recommended to be taken simultaneously |
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| Subjects that continue the syllabus |
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| Other comments |
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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 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: Plastics shall not be used. Double-sided printing 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. - It will work to identify and change gender biases and attitudes, and influence the environment to change them and promote values of respect and equality. - Situations of discrimination should be identified and actions and measures 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.