Syllabus

Subject

Subject / Group	11279 - Material Physics / 1
Degree	Master's Degree in Chemical Science and Technology Master's Degree in Advanced Physics and Applied Mathematics
Credits	3
Period	First semester
Language of instruction	English

Professors

Lecturers	Office hours for students					
	Starting time	**Finishing time**	**Day**	**Start date**	**End date**	**Office / Building**
Rubén Santamarta Martínez ruben.santamarta@uib.es	11:30	12:30	Thursday	13/09/2018	28/02/2019	Director CEP/ Antoni Maria Alcover i Sureda
	14:30	15:30	Thursday	13/09/2018	28/02/2019	Director CEP/ Antoni Maria Alcover i Sureda
Joan Torrens Serra j.torrens@uib.es	15:00	16:00	Wednesday	03/09/2018	31/07/2019	f135/mateu orfila

Context

This subject is an introduction to materials science. The basics of the structure of the materials will be presented and related to some of their functional properties. The different types of materials with their basic characteristics, processing methods and applications will be studied.

The academic and research background of the lecturers fit perfectly with the topic of the subject. Rubén Santamarta has a degree in Physics by the UIB and a PhD in Physics by the same university (2002, with honors). He is an Associate Professor at the area of Materials Science and Metallurgical Engineering, he has teaching experience since 2001 and two master's degrees in teaching. He belongs to the Material Physics research group in which his main line of research is shape memory alloys, field in which he has published more than 40 articles in indexed international journals, collaborated on more than 50 contributions tointernational conferences and participated in more than 10 national and international projects. Between 2002 and 2004 he held a post-doctoral stay at the EMAT (Antwerp, Belgium) to improve his skills in transmission electron microscopy (TEM).

Joan Torrens has a degree in Physics and also in Materials engineering and is Doctor in Materials Science (Physics) from the UAB. Currently is assistant professor in the area of Applied Physics and researcher in

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Materials Physics Group of the UIB. He has spent 2 years at IFW Dresden working in the field of Metallic Glasses. He has published about 20 papers in international indexed journals.

Requirements

Essential

Those stablished by the regulation of the Master programme in AdvancedPhysics and Applied Mathematics.

Recommended

Solid state physics

Skills

Specific

* EFM1: Deepening on the fundamentals of materials science and acquiring the knowledge on basic criteria of selection of materials for specific applications .
* CE1: Students must possess the learning skills that enable them to combine specialized knowledge in Astrophysics and Relativity, Geophysical Fluids, Materials Physics, Quantum Systems or Applied Mathematics, with the versatility that provides an open training curriculum .

Generic

* CG1: Systematic understanding of a field of study and mastery of the skills and the methods associated with the research in that field .
* CB6: Possess the knowledge and its understanding to provide the basis or opportunity to be original in developing and/or applying ideas, often within a research context .
* CB7: Students can apply the broader (or multidisciplinary) acquired knowledge and ability to solve problems in new or unfamiliar environments within contexts related to their field of study .
* CB10: Students gain the learning skills that enable them to continue studying in a way that will be largely self-directed or autonomous .

Basic

* You may consult the basic competencies students will have to achieve by the end of the Master's degree at the following address: http://estudis.uib.cat/master/comp_basiques/

Content

Range of topics

1. Introduction

   Introduction to materials science. Atomic structure. Chemical bonding.

2. Introduction to crystallography

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Arrangement of atoms. Real lattice. Crystallographic cells, directions and planes. Common structures.

3. Defects
   Point defects. Linear defects. Planar defects. Volume defects. Relation defects-material's properties.
4. Metals
   Iron and Steel. Characteristics, processing and aplications. Aluminium and its alloys. Copper and its alloys. Other metals
5. Ceramics
   Glass and traditional ceramics. Properties, processing and aplications. Advanced ceramics.
6. Polymers
   Thermostable polymers, thermoplastic polymers, elastomers. Properties, processing and aplications.
7. Composites
   Composites. Description, properties and types of composites.
8. Modern materials
   Metallic glasses, molecular materials.

Teaching methodology

In-class work activities (0.72 credits, 18 hours)

Modality	Name	Typ. Grp.	Description	Hours
Theory classes	Lectures	Large group (G)	The basics of the different contents of the subject will be explained by the lecturer.	12
Laboratory classes	Laboratory	Small group (P)	The students will perform some laboratory activities with the supervision of the lecturers	3
Assessment	Oral comunication	Large group (G)	The students will prepare and defend a topic that will be proposed by the lecturers in an oral presentation of about 15 minuts.	1
Assessment	Theoretical examination	Large group (G)	The student will be partially avaluated by means of a written assessment consisting on theoretical short questions about the contents and abilities shown along the subject. This assessment will take place between the end of the first semester and the beginning of the second semester in a day to be agreed with all the students.	2

At the beginning of the semester a schedule of the subject will be made available to students through the UIBdigital platform. The schedule shall at least include the dates when the continuing assessment tests will be conducted and the hand-in dates for the assignments. In addition, the lecturer shall inform students as to whether the subject work plan will be carried out through the schedule or through another way included in the Aula Digital platform.

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Distance education tasks (2.28 credits, 57 hours)

Modality	Name	Description	Hours
Individual self-study	Lab report	The students must write a report on the experiments performed in the lab and deliver it before the beginning of the second semester.	20
Individual self-study	Study	The students must study the contents of the subject, prepare a topic proposed by the lecturer and defend it in public	37

Specific risks and protective measures

The learning activities of this course do not entail specific health or safety risks for the students and therefore no special protective measures are needed.

Student learning assessment

If the final mark considering the average weight of each activity is equal to or greater than 5 but the student has not obtained the minimum score required in theelements of assessment a overall grade of 4.5 will be applied.

Frau en elements d'avaluació

In accordance with article 33 of Academic regulations, "regardless of the disciplinary procedure that may be followed against the offending student, the demonstrably fraudulent performance of any of the evaluation elements included in the teaching guides of the subjects will lead, at the discretion of the teacher, a undervaluation in the qualification that may involve the qualification of "suspense 0" in the annual evaluation of the subject".

Oral comunication

Modality	Assessment
Technique	Oral tests **(retrievable)**
Description	The students will prepare and defend a topic that will be proposed by the lecturers in an oral presentation of about 15 minuts.

Assessment criteria

Final grade percentage: 30%

Theoretical examination

Modality	Assessment
Technique	Extended-response, discursive examinations **(retrievable)**
Description	The student will be partially avaluated by means of a written assessment consisting on theoretical short questions about the contents and abilities shown along the subject. This assessment will take place between

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the end of the first semester and the beginning of the second semester in a day to be agreed with all the students.

Assessment criteria

Final grade percentage: 40%

Lab report

Modality	Individual self-study
Technique	Student internship dissertation **(retrievable)**
Description	The students must write a report on the experiments performed in the lab and deliver it before the beginning of the second semester.

Assessment criteria

Final grade percentage: 30%

Resources, bibliography and additional documentation

Basic bibliography

- The science and engineering of materials / Donald R. Askeland. Boston : PWS, 1994. (In English and Spanish)
- Introduction to materials science for engineers / James F. Shackelford. Madrid : Prentice-Hall, 1998. (In English and Spanish)
- Ciencia e Ingenieria de los materiales/ J.M. Montes, F.G. Cuevas, J. Cintas. Paraninfo, 2014. (In Spanish)
- Introducción a la ciencia e ingeniería de los materiales / William D.Callister Barcelona : Reverté, DL1995-1996 (In Spanish. English version existing)

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