Universitat de les Illes Balears

Teaching guide

Academic year	2016-17
Subject	11279 - Material Physics
Group	Group 1, 1S
Teaching guide	A
Language	English

Subject identification

Subject	11279 - Material Physics
Credits	0.72 de presencials (18 hours) 2.28 de no presencials (57 hours) 3 de totals (75 hours).
Group	Group 1, 1S (Campus Extens)
Teaching period	First semester
Teaching language	English

Professors

Lecturers	Horari d'atenció als alumnes					
	Starting time	**Finishing time**	**Day**	**Start date**	**Finish date**	**Office**
Rubén Santamarta Martínez ruben.santamarta@uib.es	15:00	16:00	Tuesday	12/09/2016	24/07/2017	F114 - 1r pis, Mateu Orfila (imprescindible cita prèvia)
	12:00	13:00	Tuesday	12/09/2016	24/07/2017	F114 - 1r pis, Mateu Orfila (imprescindible cita prèvia)
Joan Torrens Serra j.torrens@uib.es	15:00	17:00	Monday	15/09/2016	01/02/2017	F135
	15:00	16:00	Monday	01/03/2017	04/06/2017	F135

Contextualisation

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 Applied Physics,hehas teaching experience since 2001 and two master's degrees in teaching. Hebelongs to the Material Physicsresearch group in which his main line of research is shape memory alloys, field in which he has published more than 40 articles in indexedinternational journals,collaborated on more than 50 papers in international 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 Materials Physics Group

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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 requirements

Those stablished by the regulation of the Master programme in Physics (FAMA)

Recommendable

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

Theme content

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

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 performsome laboratory activities with the supervision of the lecturer	4
Assessment	Oral comunication	Large group (G)	The students will present an essay proposed by the lecturer	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 Campus Extens platform.

Distance education work activities

Modality	Name	Description	Hours
Individual self-study	Essay	The students must write an essay proposed by the lecturer.	29

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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 March 13th	28

Specific risks and protective measures

In the laboratory, students must follow the lecturer indications for a save manipulation of experimental equipments

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.

Oral comunication

Modality	Assessment
Technique	Oral tests **(retrievable)**
Description	The students will present an essay proposed by the lecturer
Assessment criteria	

Final grade percentage: 20%

Essay

Modality	Individual self-study
Technique	Papers and projects **(retrievable)**
Description	The students must write an essay proposed by the lecturer.
Assessment criteria	

Final grade percentage: 50%

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 March 13th
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)

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- 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)

Date of publication: 17/11/2016