



Academic year	2014-15
Subject	11279 - Material Physics
Group	Group 1, 1S
Teaching guide	A
Language	English

## Subject identification

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

## Professors

Lecturers	Horari d'atenció als alumnes					
	Starting time	Finishing time	Day	Start date	Finish date	Office
Rubén Santamarta Martínez <a href="mailto:ruben.santamarta@uib.es">ruben.santamarta@uib.es</a>	17:30h	19:30h	Thursday	25/09/2014	17/07/2015	F114 - 1r pis, Edifici Mateu Orfila (imprescindible concertar cita prèvia per email)
Joan Torrens Serra <a href="mailto:j.torrens@uib.es">j.torrens@uib.es</a>	15:00h	17:00h	Monday	29/09/2014	01/07/2015	f132

## 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 and a PhD in Physics UIB from the same university (2002, with honors). He is an Associate Professor in the area of Applied Physics, has teaching experience from 2001 and two master's degrees in teaching and belongs to the Physics of Materials research group. His main line of research are shape memory alloys, field in which has published more than 40 articles in international journals indexed, he has collaborated on more than 50 papers in international conferences and participated in over 10 national and international projects. Between 2002 and 2004 held a post-doctoral stay at the EMAT (Antwerp, Belgium) to improve their 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 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

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### Essential requirements

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

### Recommendable

Solid state physics

## Skills

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### Specific

- \* EFM1 Deepening the fundamentals of materials science and knowledge of basic criteria for selection of materials for specific applications.
- \* EFM4 Infer and draw general conclusions from the results of various measurements.
- \* EFM5 Mastering the fundamentals of thermodynamic phase diagrams of materials and capacity to analysis these diagrams.

### Generic

- \* Systematic understanding of a field of study and mastery of skills and methods of research associated with that field.

### 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/](http://estudis.uib.cat/master/comp_basiques/)

## Content

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### Theme content

1. Introduction  
Introduction to materials science
2. Chemical bonding and atomic structure  
Atomic structure. Chemical bonding.
3. Introduction to crystallography  
Cell. The real net. Basics of crystallography.
4. Defects





Point defects. Linear defects. Surface defects. Volume defects. Relation defects-material's properties.

5. Metals

Iron and Steel. Characteristics, processing and applications. Aluminium and its alloys. Copper and its alloys. Other metals

6. Ceramics

Glass and traditional ceramics. Properties, processing and applications. Advanced ceramics.

7. Polymers

Thermoplastic polymers, thermoplastic polymers, elastomers. Properties, processing and applications.

8. Composites

Composites. Description, properties and types of composites.

9. 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 perform some laboratory activities with the supervision of the lecturer	4
Assessment	Oral communication	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
Individual self-study	Lab report	The students must write a report on the experiments performed in the lab	28





## Specific risks and protective measures

In the laboratory, students must follow the lecturer indications for a safe 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 the elements of assessment a overall grade of 4.5 will be applied.

### Oral communication

Modality	Assessment
Technique	Oral tests ( <b>retrievable</b> )
Description	The students will present an essay proposed by the lecturer
Assessment criteria	
Final grade percentage:	20% with minimum grade 4

### Essay

Modality	Individual self-study
Technique	Papers and projects ( <b>retrievable</b> )
Description	The students must write an essay proposed by the lecturer.
Assessment criteria	
Final grade percentage:	50% with minimum grade 4

### Lab report

Modality	Individual self-study
Technique	Student internship dissertation ( <b>retrievable</b> )
Description	The students must write a report on the experiments performed in the lab
Assessment criteria	
Final grade percentage:	30% with minimum grade 4

## 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 Ingeniería de los materiales/ J.M. Montes, F.G. Cuevas, J. Cintas. Paraninfo, 2014. (In Spanish)





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- Introducción a la ciencia e ingeniería de los materiales / William D.Callister Barcelona : Reverté, DL1995-1996 (In Spanish. English version existing)

