SUBJECT TEACHING GUIDE

M1298 - Special Metal Alloys

Master's Degree in New Materials

Academic year 2018-2019

1. IDENTIFYING DATA					
Degree	Master's Degree in New Materials			Type and Year	Optional. Year 1
Faculty	Faculty of Sciences				
Discipline	Optional Module: Materials Subjects				
Course unit title and code	M1298 - Special Metal Alloys				
Number of ECTS credits allocated	5	Term	Semester based (2)		
Web					
Language of instruction	Spanish	English Friendly	Yes	Mode of delivery	Face-to-face

Department	DPTO. CIENCIA E INGENIERIA DEL TERRENO Y DE LOS MATERIALES
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3.1 LEARNING OUTCOMES
- Aim to deep into metallic alloys, in particular those most used in engineering
- To know of strong and important relationship between chemical composition, microstructure and properties of materials
- To obtain an ability to select the proper metallic system for each particular application
- To know the advance and development of last metallic alloys, point out multidisciplinar criteria
- Regard to the implementation of composites materiales with metallic matrix, CMMs, in a broad of industrial activities
- To obtain the ability of deep analysis against the strong and advanced industrial development , taking account the particular variables linked with each industrial sector

4. OBJECTIVES

To know the main metallic alloys
To look for relationship between manufacturing process and their behaviour in service
To know manufacturing, processing of metallic alloys
To understand the reason to use physicochemical-mechanics tests in order to characterize properties of advanced metallic systems
To consider all variables to selection proper materials, including using probabilistic method, as Fuzzy one, for example, associated to corrosion phenomenon
Be able to justify the strong relation between microstructure and nanostructure of metallic systems and their properties
To organize visit to cantabria industries linked with this lectures in order to introduce to students to real manufacturing and market organization
To know the corrosion behaviour of metallic systems

6. COURSE ORGANIZATION

CONTENTS	
1	Ferrous alloys, steels, cast iron, Superalloys based Fe
2	Light alloys::Al, Be, Mg and Li alloys
3	copper alloys, nickel alloys, and different advanced superalloys (memory shape alloys, high entropy alloys, etc.)
4	Others alloys and composites materiales with metallic matrix

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Oral presentation with intensive daily activities	Written exam	No	Yes	40,00
Final personal work wherein students must present in an oral mode with high participation of all students. It is obligatory	Work	No	Yes	40,00
Daily evaluation	Others	No	No	20,00
TOTAL				100,00

Observations
The activities developed along the semester, laboratory lectures, enterprises visits, etc. are not able to recover
Observations for part-time students

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

Apraiz: "Hierros, aceros y fundiciones". Ed. Urmo. 1985
Metals Handbook Desk Edition, 2nd Edition Ed. J.R. Davis, 1998
PERO-SANZ ELORZ, J. A. “Materiales para ingeniería, fundiciones férreas” Ed. Dossat, D.L. Madrid. 1994.
Y. Weng, H. Dong, Y. Gan, Advanced Steels.The Recent Scenario in Steel Science and Technology, Springer, 2011.
M. F. Ashby, Materials Selection in Mechanical Design, 3rt edition, Elsevier, 2005
M.J. Donachie and S.J. Donachie, Superalloys: A Technical Guide, 2nd ed., ASM International, 2002
“Fundamental of Metal Matrix Composites”
Butterworth-Heinemann, USA, 1993
P. K. Mallik, Fiber-Reinforced Composites, Materials, Manufacutring and Design, 3rt CRC Press, 2007
“Aleaciones ligeras”. Edicions UPC, Barcelona, 2001.
RUIZ PRIETO, J. M. “Metales y aleaciones no ferreas” Ed. Fundación Gómez-Pardo, D.L. Madrid, 1976.
“Aluminum and aluminum alloys”. Materials Park, Ohio. ASM International, 1993
FRANK, K. “El aluminio y sus aleaciones” Ed. Limusa-Noriega. México, 1992.
KAINER, K. U. “Magnesium alloys and Technology”. Editorial: Weimheim : Wiley-VCH, 2003.
B. Geddes, H. Leon, X. Huang, Superalloys: Alloying and Performance, ASM International, 2010