SUBJECT TEACHING GUIDE

G1082 - Materials and Mechanical Technology

Degree in Marine Engineering

Academic year 2023-2024

1. IDENTIFYING DATA					
Degree	Degree in Marine Engineering			Type and Year	Compulsory. Year 3
Faculty	School of Maritime Engineering				
Discipline	Subject Area: Materials and Mechanical Technology				
Course unit title and code	G1082 - Materials and Mechanical Technology				
Number of ECTS credits allocated	6	Term		Semester based (1)	
Web					
Language of instruction	Spanish	English Friendly	No	Mode of delivery	Face-to-face

Department	DPTO. CIENCIA E INGENIERIA DEL TERRENO Y DE LOS MATERIALES
Name of lecturer	MARIA VICTORIA BIEZMA MORALEDA
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Other lecturers	ISIDRO ALFONSO CARRASCAL VAQUERO ANDRES SANCHEZ ABELLEIRA

3.1 LEARNING OUTCOMES

- To develop the abilities to identiy the problems of the service materials
  To know the main techniques to use in order to define a service materials failures
  To estmate the useful life of metallic and non metallic component or strcutres suing in agressie environements
  To know adavances techniques of materials characterization
  Study in deep the anticorrosive methods using in marine environments

- IN ACCORDANCE WITH RULE III/2 . OF THE STCW CONVENTION IN ITS ENMENDATED FORM, the results are required after the acquisition of the competence to program the operations, whose knowledge, comprehension and sufficiency involve in the subject a theoretical knowledge.
  Competent results should also be obtained from the proper use of hand tools, machines, and measuring instruments for build and reparing activities in a ship. The lectures may provide results such as:

  haracterization and limitations of materials used for the construction and repair of ships and equipment, characteristics and process limitations used for manufacturing and repair, properties and parameters relating to the manufacture and repair of systems and components Methods for safe temporary emergency repairs
  Safety measures to be adopted to ensure a safe working environment and for the use of hand tools, machine tools and measuring instruments Use of hand tools, measuring machines use of different types of sealants and packaging
  As far as competence Maintenance and repair of onboard machines and equipment is concerned, the necessary basic mechanical knowledge, both theoretical and practical, maintenance, repair, such as dismantling, shall be provided, adjustment and reassembly of machinery and equipment,, use of specialized tools and appropriate measuring instrumentalists and Project characteristics and selection of materials for Construction

- To be able solve problems related to materials and application to real solid behaviour in strcucture , intallations and marine components and elements.

4. OBJECTIVES

To know metallic, polymeric, ceramic and composite materials, in particular ferrous alloys, light metallic systema and superalloys, inorder to stablich a very clear relationship between chemical composition and properites. To know the main physico-chemical-mechanical properties of materials pointing out the study in marine and petrochemistry environments.
To study the corrosion and anticorrosive methods applied to metallic systems and degratation phenomenon in non metallic materials
To know the machining way of metallic materials, point out and suing the real tools employed in situ in a ship.
To deep in welding process

6. COURSE ORGANIZATION	
CONTENTS	
1	Introduction: metallic materials, ceramic materials, poilymeric materials and composite materials Evoltion of the employ of materials: from Neolitic to S. XXi
2	Materials Characterization Tests Destructive Tests: including metallographic characterization, Non Destructive Tests Some iof these methods will be used at laboratory practices
3	Physic Metallurgy of Metallic Systems Concept of metal. Defect in materials. Diffusion Laws, Equilibrium Diagrams, Application to metallic and ceramic materials
4	Steels: Properties and Applications Classifcation of steel Role of the main chemical elements in steels Equilirium Diagram Fe-Fe3C. Thermal and Thermochemical treatments Steels for particular applications
5	Properties and Application of: Non Ferrous Alloys Cu and allosy, Light Alloys (Al, Mg, Ti, Be), Superalloys (Fe, Ni and Co), Refractory Materials (Mo, W, Ta, Nb)
6	Corrosion adn Protection of metallic system Introduction and corrosion classification Description of the main corrosion morphologies Electrochemical Corrosion high Temperatures Corrosion Anticorrosion methods
7	Non Metallic Materials: Polymers, Ceramic and Composites Classification of Polymers. Properties and application. Degradation Classification of Ceramic: Properties and application. Degradation Classification of Composites: Properties and application. Degradation
8	Metalllic manufacturing by plastic deformation
9	Tools empoyed at mechanical area in a ship
10	Welding and Plastic deformation for shaped

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
The evaluation is designed in two very well defined concepts: 50% final examination. This ones implies a test, short and concise questions and problems 50%: student active participation. it scope of consideration: partici`pation during lectures, inform of	Written exam	Yes	Yes	50,00
There are a very clear current evaluation, daily, considering laboratoy inform, in situ practices of machining, etc	Laboratory evaluation	Yes	Yes	50,00
		No	No	0,00
TOTAL				100,00

Observations

It is a necesary requisite to pass both examns, of two implied departments, to pass Materials and Technology
It is necessary that the lectures attendance be 85% minimum
The minimum calification of examamination must be minum 4.0 to average with aditional activities, problmes collections, lecture participation, last year work and oral exposition, etc.
The lab practices are obligatory

Observations for part-time students

Students who are in a part time situation may take a partial examination, to be determined by the teachers and pupils depending on the availability of both. In any case, preferably in November. Practices are mandatory, so channels of substitution would be established.

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

"Colección de problemas resueltos de ciencias de materiales aeroespaciales / Eva Mª Pérez Soriano, Cristina Mª Arévalo Mora, Isabel Montealegre Meléndez. Sevilla : Editorial Universidad de Sevilla, 2018. ISBN: 978-84-472-1900-1
"Ciencia e Ingeniería de los Materiales", J. M. Montes, F. G. Cuevas, J. Cintas, Ed. Paraninfo, España, 2014
"Introducción de la Ciencia e Ingeniería de Materiales para Ingenieros", 7 ed.J. F. Shackelford, Editorial Prentice-Hall.. 2010
"Ciencia e ingeniería de materiale"s / William D. Callister, Jr., David G. Rethwisch. Edición: 2ª ed. Barcelona : Reverté, 2016. ISBN: 978-84-291-7251-5
“Ciencia e ingeniería de los materiales / D. R. Askeland, Pradeep P. Phulé ; 4ª ed. México, D.F. : CENGAGE Learning, 2009
PROBLEMAS DE CIENCIA DE MATERIALES F. Salas Vicente, E, F. Segovia López, A. Vicente Escuder, Ed. UPV, 2019

Materials for Engineers” / W. F. Hosford. New York : Cambridge University Press, 2008.
"Fundamento de la Ciencia e Ingeniería de los Materiales" Smith, MCGRAW-HILL, 2010
“Fundamentos de Manufactura Moderna”, Materiales, procesos y sistemas. M. P. Groover, Prentice Hall, Méjico, 1997
"Tecnología de los materiales en ingeniería" / José Antonio Puértolas Ráfales, Ricardo Ríos Jordana, Miguel Castro Corella. Madrid : Síntesis, D.L. 2016. ISBN: 978-84-9077-405-2 (O.C.)

- “Tecnología Mecánica 1” , Tomás Vidondo, Claudino Alvarez, Ed. Edebé, España 1976
- “Tecnología Mecánica 2” , Tomás Vidondo, Claudino Alvarez, Ed. Edebé, España 1978
- “Máquinas Prontuario” , Nicolás Larburu Arrizabalaga, Ed. Paraninfo, España 2008
- “A. L. Casillas” , Máquinas, cálculos de Taller.