INSTITUTO POLITÉCNICO DE BRAGANÇA

Course Unit	Materials in Mechanical Design			Field of study	Technological Processes		
Bachelor in	Industrial Management and Engineering			School	School of Technology and Management		
Academic Year	2022/2023	Year of study	2	Level	1-2	ECTS credits	6.0
Type	Semestral	Semester	1	Code	9104-754-2103-00-22		

Workload (hours)	162	Contact hours	T -	TP 60	PL -	TC -	S -	E -	OT -	O -

T - Lectures; TP - Lectures and problem-solving; PL - Problem-solving, project or laboratory; TC - Fieldwork; S - Seminar; E - Placement; OT - Tutorial; O - Other

Name(s) of lecturer(s): João da Rocha e Silva

Learning outcomes and competences

At the end of the course unit the learner is expected to be able to:
1. Acquiring knowledge and understanding the properties of materials used in engineering.
2. Relate structure and properties of materials used in engineering.
3. Acquiring knowledge on the latest materials used in engineering and its applications.
4. Relate the materials and properties in order to propose new materials and new applications.

Prerequisites

Before the course unit the learner is expected to be able to:
Not Applicable

Course contents

Steels, properties, microstructure and processing. Stainless steel. Iron. Non-ferrous alloys. Thermoplastics. Resins Composites. Ceramic. Biomaterials.

Course contents (extended version)

1. Metals
   - Steel
   - Cast Iron
   - nonferrous alloys
   - Manufacturing
2. Ceramic
   - Types and structure of ceramic
   - Manufacturing of ceramic
   - Glass
   - Ceramic properties
3. Polymer
   - Structure
   - Types of polymers
   - Polymers transformation processes
   - Mechanical behavior of polymers
4. Composites
   - Reinforcements and dies
   - Manufacturing Composites
   - Composites reinforced with fibers and composites reinforced with particles
   - Other Composites
5. Biomaterials
   - Characteristics of biomaterials and their applications. Biocompatibility tests.

Recommended reading

1. Lucas Filipe Martins da Silva, Fernando Jorge Lino Alves, António Torres Marques, Materiais de Construção, Engebook, 2014
2. William F Smith, Principles of Materials Science and Engineering, 3rd ed. , McGraw-Hill, 1996
3. Pinto Soares, Aços Características e Tratamentos, Pinto Soares
4. ASM International Handbook Committee; Engineered materials handbook
5. RWK Honeycombe, Aços micro estrutura e propriedades, Fundação C. Gulbenkian

Teaching and learning methods

Theoretical-practic classroom. Laboratory work and reporting. In no presence environmental, resolution of problems and practical work.

Assessment methods

1. Alternative 1 - (Regular, Student Worker) (Final)
   - Practical Work - 20%
   - Intermediate Written Test - 60% (Minimum score 7/20 points)
   - Case Studies - 20%
2. Alternative 2 - (Regular, Student Worker) (Final, Supplementary, Special)
   - Final Written Exam - 100%

Language of instruction

1. Portuguese, with additional English support for foreign students.
2. Spanish

Electronic validation

João da Rocha e Silva	João Eduardo Pinto Castro Ribeiro	António Jorge da Silva Trindade Duarte	Paulo Alexandre Vara Alves
29-09-2022	06-10-2022	11-10-2022	05-11-2022