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| <b>POLI</b><br>ESCOLA SUPERIOR<br>TECNOLÓGIA<br>GESTÃO<br><b>TÉCNICO</b><br><b>GUARDA</b> | <b>SUBJECT DESCRIPTION</b> | <b>MODELO</b><br>PED.013.03 |
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|                                                                                                     |                                       |                              |            |              |              |   |
|-----------------------------------------------------------------------------------------------------|---------------------------------------|------------------------------|------------|--------------|--------------|---|
| Course                                                                                              | Mechanical and Industrial Informatics |                              |            |              |              |   |
| Subject                                                                                             | Chemical and Materials                |                              |            |              |              |   |
| Academic year                                                                                       | 2023/2024                             | Curricular year              | 1st        | Study period | 1st semester |   |
| Type of subject                                                                                     | Compulsory                            | Student workload (H)         | Total: 162 | Contact: 60  | ECTS         | 6 |
| Professor(s)                                                                                        | José Reinas dos Santos André          |                              |            |              |              |   |
| <input checked="" type="checkbox"/> Area Coordinator<br><input type="checkbox"/> Head of Department | (select)                              | José Reinas dos Santos André |            |              |              |   |

## PLANNED SUBJECT DESCRIPTION

### 1. LEARNING OBJECTIVES

- O1. Interpret the material and its transformations using concepts from Chemistry
- O2. Identify and characterize types of intra and intermolecular connections
- O3. Justify properties of substances based on intra and intermolecular connections
- O4. Characterize materials based on their structures, properties and applications
- O5. Select materials for different applications
- O6. Apply electrochemical and electrolyte processes for practical purposes
- O7. Identify phenomena of corrosion and select methods for suitable anticorrosive protections.

### 2. PROGRAMME

- 1. Atomic and chemical alloy structure
- 2. Classification of polymers
- 3. Commercial thermoplastics
- 4. Elastomers
- 5. Composites
- 6. Electrochemistry
- 7. Corrosion of materials
- 8. Corrosion forms
- 9. Protection of materials from corrosion.

### 3. COHERENCE BETWEEN PROGRAMME AND OBJECTIVES

- 1. Atomic and chemical alloy structure (O1, O2, O3)
- 2. Classification of polymers (O1, O2, O4, O5)

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3. Commercial thermoplastics (O1, O2, O3, O4, O5)
4. Elastomers (O1, O2, O3, O4, O5)
5. Composites (O1, O2, O3, O4, O5)
6. Electrochemistry (O6)
7. Corrosion of materials (O6, O7)
8. Types of corrosion (O6, O7)
9. Protection of materials from corrosion (O6, O7).

#### 4. MAIN BIBLIOGRAPHY

##### **Mandatory**

- i) *Textos de Apoio coligidos pelo Prof. Reinas André (2022), Química e Materiais, Guarda, Instituto Politécnico da Guarda;*
- ii) *André, J. R.S., (2022), Guia de Laboratório de Química e Materiais, Guarda, Instituto Politécnico da Guarda;*

##### **Recommended**

- i) *Chang, R., Goldsby, K., Química, 11ª ed., McGraw-Hill, 2013, ISBN 9789899717275;*
- ii) *Mahan, B.H. (2002), Química um Curso Universitário, São Paulo, Editora Blucher;*
- iii) *Smith W. F., Princípios de Ciência e Engenharia de Materiais, 3ªed., McGraw-Hill International Editions, 1998;*
- IV) *Fontana, M.G. & Green, N.D. Corrosion Engineering, Ed. Nace, 1986, ISBN 9780072939736.*
- V) *Gentil, V. Corrosão, 4ª ed., Livros Técnicos e Científicos, 2003, ISBN 9788521613411.*

#### 5. TEACHING METHODOLOGIES (INCLUDING EVALUATION)

Lectures consist of exposure of the material addressed in the programme. Theoretical-practical classes are of decisive importance for the academic success of students in this subject, so student study hours should be considered as active. Laboratory classes take place in the Chemistry Lab.

There are two tests, one regular exam and another on appeal, both covering all the material.

#### 6. COHERENCE BETWEEN TEACHING METHODOLOGIES AND OBJECTIVES

The lectures and problem solving will equip the students with knowledge to characterize materials based on their structure, properties and transformation. Debate, observing experiments and problem solving in the tutorial sessions will help to consolidate their knowledge.

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## 7. ATTENDANCE

## 8. CONTACTS AND OFFICE HOURS

DELETE SECTION 8. IN COMPLETED SUBJECT DESCRIPTION

[jandre@ipg.pt](mailto:jandre@ipg.pt); Gabinete 13; horário de atendimento: 3ª feira 11.30-12.30 +14-15 + 4ª feira 11.30-12.30.

## 9. OTHERS

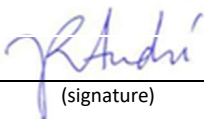
DELETE SECTION 9. IN COMPLETED SUBJECT DESCRIPTION

## DATE

18 de setembro de 2023

## SIGNATURES

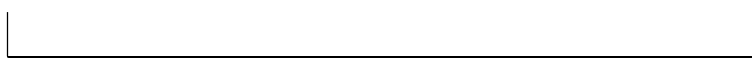
Professor

  
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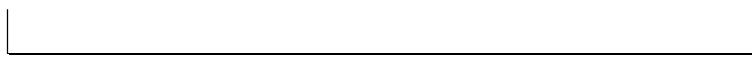
Area Coordinator

  
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