

Academic Year: (2019 / 2020)

Review date: 20-04-2020

Department assigned to the subject: Materials Science and Engineering and Chemical Engineering Department

Coordinating teacher: BAUTISTA ARIJA, MARIA ASUNCION

Type: Electives ECTS Credits : 6.0

Year : 4 Semester : 1

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Technology of Materials

OBJECTIVES

Know the phenomena and technologies associated with materials' surfaces, including their service behaviour against wear and corrosion, surface preparation treatments to carry out their right protection, and adhesive bonding.

DESCRIPTION OF CONTENTS: PROGRAMME

1. Corrosion and protection
 - 1.1. High temperature corrosion: thermodynamics and kinetic
 - 1.2. Aqueous corrosion: thermodynamics and kinetic
 - 1.3. Types and mechanisms of electrochemical attack
 - 1.4. Methods to evaluate the corrosion performance
 - 1.5. Protection techniques
2. Surface preparation
 - 2.1. Cleaning
 - 2.2. Roughness
3. Protective coatings
 - 3.1. Metallic coatings
 - 3.2. Ceramic coatings
 - 3.3. Organic coatings
4. Wear
 - 4.1. Wear mechanisms
 - 4.2. Metallurgical aspects
5. Technology of adhesives
 - 5.1. Basic concepts
 - 5.2. Adhesion models
 - 5.3. Families of adhesives
 - 5.4. In-service behaviour

LEARNING ACTIVITIES AND METHODOLOGY

Each student must assist to four lab sessions, obtain experimental data and fulfil the corresponding exercises. Sessions will have following contents:

- session 1: Corrosion
- session 2: Corrosion
- session 3: Surface preparation
- session 4: Coatings

ASSESSMENT SYSTEM

- 60%: final exam.
- 15%: lab practices.
- 10%: working on a dossier.
- 15%: individual exercises and problems.

% end-of-term-examination:	60
% of continuous assessment (assignments, laboratory, practicals...):	40

BASIC BIBLIOGRAPHY

- A.J. Kinloch. Adhesión and Adhesives, Chapman&Hall, 1990
- E. Otero Huerta Corrosión y degradación de materiales, Síntesis.
- J.A. González Fernández Control de la corrosión. Estudio y medida por técnicas electroquímicas, CSIC.
- J.A. Puértolas y otros Tecnología de superficies de materiales, Síntesis.
- L.F.M. da Silva et al Handbook of Adhesion Technology, Springer, 1990
- Varios Adhesives and Sealants - Eng. Mater. Handbook vol 3, ASM, 1990
- Varios Friction, Lubrication and Wear Tecnology - ASM Handbook vol 18, ASM, 1995

ADDITIONAL BIBLIOGRAPHY

- null ASM Handbook ç Vol. 13: Corrosion, ASM.
- A. Foresgren Corrosion control through organic coatings, CCR/Taylor and Francis.
- J.A. Puértolas y otros Tecnología de superficies de materiales, Síntesis.
- M.G. Fontana Corrosion Engineeringç. Materiales Science and Engineering Series, McGraw-Hill International..
- R. Baboian Corrosion tests and standards : application and interpretation, ASTM.
- R.A. Cottis Sheir's Corrosion, Elsevier, 2010