

Academic Year: ( 2023 / 2024 )

Review date: 28-04-2023

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

Coordinating teacher: VAREZ ALVAREZ, ALEJANDRO

Type: Electives ECTS Credits : 6.0

Year : Semester :

**REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)**

Materials Science and Engineering, Materials Technology

**SKILLS AND LEARNING OUTCOMES**

CB1. Students have demonstrated possession and understanding of knowledge in an area of study that builds on the foundation of general secondary education, and is usually at a level that, while relying on advanced textbooks, also includes some aspects that involve knowledge from the cutting edge of their field of study

CB2. Students are able to apply their knowledge to their work or vocation in a professional manner and possess the competences usually demonstrated through the development and defence of arguments and problem solving within their field of study.

CB3. Students have the ability to gather and interpret relevant data (usually within their field of study) in order to make judgements which include reflection on relevant social, scientific or ethical issues.

CB5. Students will have developed the learning skills necessary to undertake further study with a high degree of autonomy.

CG1. Ability to solve problems with initiative, decision-making, creativity, critical reasoning and to communicate and transmit knowledge, skills and abilities in the field of Industrial Engineering.

CG3. Ability to design a system, component or process in the field of Industrial Technologies to meet the required specifications

CG4. Knowledge and ability to apply current legislation as well as the specifications, regulations and mandatory standards in the field of Industrial Engineering.

CG5. Adequate knowledge of the concept of company, institutional and legal framework of the company. Organisation and management of companies.

CG6. Applied knowledge of company organisation.

CG8. Knowledge and ability to apply quality principles and methods.

CG9. Knowledge and ability to apply computational and experimental tools for the analysis and quantification of Industrial Engineering problems.

RA2. Engineering Analysis: To be able to identify engineering problems within the industrial field, recognise specifications, establish different resolution methods and select the most appropriate one for their solution

RA4. Research and Innovation: To be able to use appropriate methods to carry out research and make innovative contributions in the field of Industrial Engineering.

RA5. Engineering Applications: To be able to apply their knowledge and understanding to solve problems and design devices or processes in the field of industrial engineering in accordance with criteria of cost, quality, safety, efficiency and respect for the environment.

**OBJECTIVES**

- Ability to search the most adequate testing techniques in the field of materials
- Ability to understand and differentiate the relevant information from a test/calibration report to take a decision, in the field of Materials Science and Engineering.
- Ability to use multi-disciplinary knowledge to deal with a problem.
- Ability to work in groups and distribute the work to deal with complex problems.
- Ability to extrapolate quality processes of materials and the standards related to materials to other engineering disciplines.

**DESCRIPTION OF CONTENTS: PROGRAMME**

1. Standards and Product Certification
2. National Accreditation Body
3. Testing Laboratories and ISO 17025 accreditation.
4. Chemical Testing: Wet and dry way. Spectroscopic techniques.

5. Tests on Plastic Materials
6. Tests on Adhesives
7. Metallurgical Testing
8. Ceramic Testing
9. Tests on Powder Metallurgy
10. Tests on Composite Materials
11. Calibration Equipment
12. Estimation of uncertainty in Calibration and in Test

#### LEARNING ACTIVITIES AND METHODOLOGY

- Teaching classes.
- Class exercises.
- Lab practices.

#### ASSESSMENT SYSTEM

- Several exams during the course: 60%.
- Lab practices: 20%
- Class exercises: 20%.

<b>% end-of-term-examination:</b>	0
<b>% of continuous assessment (assignments, laboratory, practicals...):</b>	100

#### BASIC BIBLIOGRAPHY

- null CGA-ENAC-LEC Rev. 10 Marzo 2021. Criterios Generales para la acreditación de Laboratorios de Ensayo y Calibración según Norma UNE-EN-ISO/IEC 17025 (Octubre 2014, ENAC. Entidad Nacional de Acreditación, 2021
- null CGA-ENAC-LEC Rev. 6 Octubre 2014. Criterios Generales para la acreditación de Laboratorios de Ensayo y Calibración según Norma UNE-EN-ISO/IEC 17025 (Octubre 2014, ENAC. Entidad Nacional de Acreditación, 2014
- null Guide to the expression of Uncertainty in Measurement. Guia GUM , BIPM-Bureau International des Poids et Mesures, 2008
- Norma UNE-EN ISO/IEC 17025:2005.- Evaluación de la conformidad. Requisitos generales para la competencia de los laboratorios de ensayo y de calibración., AENOR, 2005
- UNE-EN ISO/IEC 17025:2017.- Evaluación de la conformidad. Requisitos generales para la competencia de los laboratorios de ensayo y de calibración., AENOR, 2017
- Douglas A. Skoog, F. James Holler, Timothy A. Nieman PRINCIPIOS DE ANALISIS INSTRUMENTAL, MC GRAW HILL INTERAMERICANA, 2000
- Jordi Riu, Ricard Boqué, Alicia Maroto, F. Xavier Rius ¿Determinación de la trazabilidad en medidas físicas¿ , Técnicas de Laboratorio , 2000
- María Rosa Gómez Antón Ensayos en materiales polímeros. Plásticos y cauchos, Universidad Nacional de Educación a Distancia, 2009
- S L R Ellison y A Williams Trazabilidad Metrológica en la Medición Química Una guía para lograr resultados comparables en medición química , Guía EURACHEM / CITAC , 2020
- Vicente Alvarez García La Normalización Industrial, Tirant lo Blanch, Universitat de Valencia, 1999

#### ADDITIONAL BIBLIOGRAPHY

- CEM PROCEDIMIENTO TH- 003 PARA LA CALIBRACIÓN POR COMPARACIÓN DE TERMOPARES, CEM-Centro Nacional de Metrología.
- CEM PROCEDIMIENTO ME-005 PARA LA CALIBRACIÓN DE BALANZAS MONOPLATO, CEM-Centro Español de Metrología.
- CEM PROCEDIMIENTO DI-008 PARA LA CALIBRACIÓN DE PIES DE REY, CEM-Centro Español de Metrología.
- J. Goldstein, D. E. Newbury, D.C. Joy, C.E. Lyman, P. Echlin, E. Lifshin, L.C. Sawyer, J.R. Michael Scanning Electron Microscopy and X-ray Microanalysis, Plenum US, 2003