COURSE DATA

Data Subject	
Code	44441
Name	Inorganic chemistry processes and products
Cycle	Master's degree
ECTS Credits	3.0
Academic year	2022 - 2023

Study (s)

Degree	Center	Acad. year	Period
2209 - M.D. in Chemical Engineering	School of Engineering	1	Second term

Subject-matter

Degree	Subject-matter	Character
2209 - M.D. in Chemical Engineering	12 - Optatividad	Optional

Coordination

Name	Department
RIBERA HERMANO, ANTONIO LUIS	320 - Inorganic Chemistry
ROMERO MARTINEZ, FRANCISCO MANUEL	320 - Inorganic Chemistry

SUMMARY

The objective of the course is to provide to the students an overview of some inorganic materials applied in industrial activities, processes of preparation, their most important properties and some of its most important applications. Emphasis will be placed on each of the items on the most relevant aspects from the point of view of chemistry.

The content of the course has focused on:
Structural materials: Ferrous alloys, low density alloys, ceramics. Cements.
Materials for Catalysis: Supported Metals, zeolites, lamellar compounds.
Materials with electrical and magnetic properties.
Glass and optical fiber.

Finally, It’s planned an introduction to Industrial Ecology to highlight the importance of optimizing resources and processes in the field of the materials studied.

The subject is taught in Spanish.

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

Other requirements

Its necessary, or at least highly recommended, to have passed modules of Inorganic Chemistry, Materials Science and Chemical Processes.
Basic English

OUTCOMES

2209 - M.D. in Chemical Engineering

- Students should apply acquired knowledge to solve problems in unfamiliar contexts within their field of study, including multidisciplinary scenarios.
- Students should be able to integrate knowledge and address the complexity of making informed judgments based on incomplete or limited information, including reflections on the social and ethical responsibilities associated with the application of their knowledge and judgments.
- Students should demonstrate self-directed learning skills for continued academic growth.
- Be able to apply the scientific method and the principles of engineering and economics to formulate and solve complex problems in processes, equipment, facilities and services in which matter changes its composition, state or energy content, these changes being characteristic of the chemical industry and of other related sectors such as pharmacology, biotechnology, materials science, energy, food or the environment.
- Communicate and discuss proposals and conclusions in specialised and non-specialised multilingual forums, in a clear and unambiguous manner.
- Adapt to changes and be able to apply new and advanced technologies and other relevant developments with initiative and entrepreneurship.
- Be able to access information tools in different areas of knowledge and use them properly.
- Be able to assess the need to complete their technical, scientific, language, computer, literary, ethical, social and human education, and to organise their own learning with a high degree of autonomy.
- Be able to defend criteria with rigor and arguments and to present them properly and accurately.
- Be able to take responsibility for their own professional development and specialisation in one or more fields of study.

- Apply critical reasoning to their knowledge of mathematics, physics, chemistry, biology and other natural sciences, obtained through study, experience and practice, in order to establish economically viable solutions to technical problems.
- Be able to solve unfamiliar and ill-defined problems that have specifications in competition by considering all possible methods of solution, including the most innovative ones, and selecting the most appropriate, and correct implementation by evaluating the different design solutions.
- Direct and supervise all types of facilities, processes, systems and services in different industrial areas related to chemical engineering.

LEARNING OUTCOMES

Provide an overview of organic products most widely applied in industry, and both their preparation processes and most important applications.

And developed in:

Knowing the chemical production processes of the materials studied.

Understanding the correlation composition - structure - properties of the materials studied.

Identify the fields of application of inorganic materials.

Being able to select the most suitable materials for specific applications.

DESCRIPTION OF CONTENTS

1. Structural Materials

Ferrous alloys: Siderurgy, Fe-Fe3C diagram.
Low Density Alloys: Preparation of Al. Duralumin.
Structural Ceramics: Alumina and zirconia.
Cement: Types. Preparation and setting of hydraulic cements

2. Catalytic materials

Supported Metals: Preparation and characterization.
Zeolites: Preparation and structure. Chemical properties.
Lamellar compounds: structure and chemical properties.

3. Materials with electric and magnetic properties

Origin of magnetism in materials.
Magnetic properties. Types of magnetic materials.
Materials.

4. Glass and optical fiber

Structural aspects.
Preparation. Types.
Signal transmission by optical fiber.

5. Introduction to industrial ecology

Industrial Ecology: Basic concepts of industrial ecology.

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	20,00	100
Classroom practices	10,00	100
Attendance at events and external activities	5,00	0
Development of group work	10,00	0
Development of individual work	10,00	0
Study and independent work	10,00	0
Preparation of evaluation activities	10,00	0
TOTAL	**75,00**	

TEACHING METHODOLOGY

The signature will be given following a methodology centered two lines:

Lectures

Performing academic jobs, individual and group. This implies writing the work, his public exposure and subsequent defense of the conclusions drawn in the presence of the rest of the students.

EVALUATION

The learning assessment includes the following items:
Attendance and participation in class
Writing and defense of the work, individual and collective.
Global examination of study contents.

The final grade will be obtained by the following distribution:
Attendance and participation: 10%
Writing and defense of Jobs: 40%
Global examination : 50%

To pass must be obtained a mark of 4 in each of the items described.

If don't approve the first convocation, the second only will evaluate the global examination of the study contents.

REFERENCES

Basic

- "Metalurgia General". F.R. Morral, E. Gimeno, P. Molera. Ed. Reverté, Barcelona, 1982.
- "Materials Science" 4th Edition.,J.C. Anderson, K.D. Leaver, R.D. Rawlings, J.M. Alexander. Chapman & Hall, London (U.K.), 1994.
- "Principles and Practice of Heterogeneous Catalysis". J.M. Thomas, W.J. Thomas. Ed. VCH, Weinheim (Alemania), 1997

Additional

- "El Vidrio". J. Ma. Fernández Navarro, Ed. CSIC, Madrid, 1991.
- "Composite Materials Handbook". M.M. Schwartz, McGraw-Hill, New York (USA), 1984
- "Chemistry of the Elements". N.N. Greenwood, A. Earnshaw. Pergamon Press, Oxford (U.K.), 1984.