

Course guide

230453 - QI - Inorganic Chemistry

Last modified: 25/05/2023

Unit in charge: Barcelona School of Telecommunications Engineering
Teaching unit: 713 - EQ - Department of Chemical Engineering.

Degree: BACHELOR'S DEGREE IN ENGINEERING PHYSICS (Syllabus 2011). (Compulsory subject).

Academic year: 2023 **ECTS Credits:** 6.0 **Languages:** Catalan, Spanish

LECTURER

Coordinating lecturer: Consultar aquí / See here:
<https://telecos.upc.edu/ca/estudis/curs-actual/professorat-responsables-coordinadors/responsables-assignatura>

Others: Consultar aquí / See here:
<https://telecos.upc.edu/ca/estudis/curs-actual/professorat-responsables-coordinadors/professorat-assignat-idioma>

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:

1. Knowledge of the chemistry laws. Knowledge of the main chemical methods of producing materials and nanomaterials. Ability to conduct and analyze basic chemical reactions.

Generical:

4. ABILITY TO IDENTIFY, FORMULATE, AND SOLVE PHYSICAL ENGINEERING PROBLEMS. Planning and solving physical engineering problems with initiative, making decisions and with creativity. Developing methods of analysis and problem solving in a systematic and creative way.

Transversal:

1. SUSTAINABILITY AND SOCIAL COMMITMENT - Level 1. Analyzing the world's situation critically and systemically, while taking an interdisciplinary approach to sustainability and adhering to the principles of sustainable human development. Recognizing the social and environmental implications of a particular professional activity.

2. EFFICIENT ORAL AND WRITTEN COMMUNICATION - Level 1. Planning oral communication, answering questions properly and writing straightforward texts that are spelt correctly and are grammatically coherent.

3. SELF-DIRECTED LEARNING - Level 1. Completing set tasks within established deadlines. Working with recommended information sources according to the guidelines set by lecturers.

TEACHING METHODOLOGY

Inside class: 2,6 ECTS. Seminal classes (theory + seminars) with the participation of the student. Homework (individual and/or team). Tutorial.

Outside class: 3,4 ECTS. Exercises and projects (theory or seminars).

LEARNING OBJECTIVES OF THE SUBJECT

- Understand and apply the basic concepts of Chemistry related to the atomic and molecular structure and the properties of matter.
- Apply the principles of chemical transformations to the knowledge and calculation of transformed reactants and products obtained.
- Justify the applications of common inorganic compounds.



STUDY LOAD

Type	Hours	Percentage
Hours large group	65,0	43.33
Self study	85,0	56.67

Total learning time: 150 h

CONTENTS

Utility of the periodic table

Description:

Organization of the periodic table. Periodic properties. Periodicity and physical and structural properties. Relationships between structure and properties.

Full-or-part-time: 28h

Theory classes: 12h

Guided activities: 4h

Self study : 12h

The covalent bond

Description:

The Lewis theory. Electron pair repulsion and structure. Hybridization and structure. Molecular orbitals. Intermolecular forces. Solids.

Full-or-part-time: 20h

Theory classes: 10h

Self study : 10h

The metallic bond

Description:

Bonding models. Cell unit, reticular point and motif. Packing factor and crystal density. Types of structures. Alloys. Properties of metals and alloys.

Full-or-part-time: 16h

Theory classes: 8h

Self study : 8h

The ionic bond

Description:

Characteristics of ionic compounds. Crystal structure of ionic compounds. The Born-Haber cycle. Periodic trends and bond formation.

Full-or-part-time: 10h

Theory classes: 5h

Self study : 5h



Chemical reactions

Description:

Introduction to inorganic reactions. Types of reactions. Simple reactions kinetics. Influence of temperature. Reaction mechanisms. Thermodynamic factors and kinetic factors.

Full-or-part-time: 24h

Theory classes: 8h

Guided activities: 8h

Self study : 8h

Acids and bases

Description:

Acids and bases of Brønsted-Lowry. The pH scale. pH calculation by means of matter and charge balances. Diagrams logc-pH. Acids and bases of Lewis.

Full-or-part-time: 20h

Theory classes: 8h

Guided activities: 4h

Self study : 8h

Oxidation and reduction

Description:

Oxidation number and formal oxidation state. Periodic trends. Redox processes. Latimer, Frost, Pourbaix. Corrosion. Electrolysis.

Full-or-part-time: 20h

Theory classes: 8h

Guided activities: 4h

Self study : 8h

Organometallic compounds

Description:

The organometallic bond. Types of organometallic compounds.

Full-or-part-time: 12h

Theory classes: 6h

Self study : 6h

GRADING SYSTEM

Qualification will include a final exam (EF) and continuous evaluation including a mid-semester exam (EP) and the participation of the student in seminar classes (P). The final qualification will be calculated as follows: $\max\{EF, 0.65*EF + 0.30*EP + 0.05*P\}$



BIBLIOGRAPHY

Basic:

- Rayner-Canham, G.W. Química inorgánica descriptiva. 2a ed. México: Addison Wesley Longman, 2000. ISBN 9789684443853.
- Puddephatt, R.J.; Monaghan, P.K. The periodic table of the elements. 2nd ed. New York: Oxford University Press, 1986. ISBN 978-0198555162.

Complementary:

- Rochow, E.G. Química inorgánica descriptiva. Barcelona: Reverté, 1981. ISBN 8429174842.
- Shriver, D.F.; Atkins, P.W.; Langford, C.H. Química inorgánica. Barcelona: Reverté, 1998. ISBN 8429170065.