Course guide
240024 - 240024 - Chemistry II

Unit in charge: Barcelona School of Industrial Engineering
Teaching unit: 713 - EQ - Department of Chemical Engineering.
Degree: BACHELOR’S DEGREE IN INDUSTRIAL TECHNOLOGY ENGINEERING (Syllabus 2010). (Compulsory subject).
Academic year: 2023  ECTS Credits: 4.5  Languages: Catalan, Spanish

LECTURER

Coordinating lecturer: Montserrat García Álvarez
Others: Montserrat García Álvarez
Joana Lalueza Baro
Alla Bedahnane, Abdelilah

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
1. Capacity to understand and apply basic knowledge principles of general chemistry, organic and inorganic chemistry and their engineering applications.

TEACHING METHODOLOGY

-Theory sessions: In these sessions the necessary theoretic concepts of the module will be introduced. Taught with the help of visual means.
-Problems sessions: In these sessions theoretic concepts will be applied to solve problems involving and encouraging students to participate.
Directed activities: Complementary work to problems or theory sessions, which strive to strengthen the student’s relationship to certain topics will be treated in regular sessions. They will be either individual or group exercises.

LEARNING OBJECTIVES OF THE SUBJECT

1-Understanding the atomic structure and studying different types of bindings between inorganic materials such as: metals, ionic solids and covalent and mixed composites.
2-Applying previous structural knowledge to determine both physical and chemical properties of inorganic material. Considering its applications from an industrial point of view and their use in the engineering field.
3-Understanding structure and bindings of organic materials. Studying composition and constitution of carbon derived compounds, as well as their constitution and formation.
4-Studying the different organic compounds families, their physical properties and the most important chemical reactions.
5-Applying previous structural and functional knowledge into using organic compounds in the chemical industry and the engineering field.

STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Self study</td>
<td>67,5</td>
<td>60.00</td>
</tr>
<tr>
<td>Hours large group</td>
<td>45,0</td>
<td>40.00</td>
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Total learning time: 112.5 h
## CONTENTS

### TOPIC 1. Covalent binding

**Description:**
- Covalent binding theories. Hybridization.
- Distances, energies and binding angles.
- Polarities and molecular binding.
- Intermolecular forces. Physical properties and aggregation states

**Related competencies:**
CE4. Capacity to understand and apply basic knowledge principles of general chemistry, organic and inorganic chemistry and their engineering applications.

**Full-or-part-time:** 17h
Theory classes: 4h
Practical classes: 3h
Guided activities: 2h 30m
Self study: 7h 30m

### TOPIC 2. The metallic binding

**Description:**
- Introduction to chemical metallic
- Metallic packaging. Polymorphism.
- Introduction to alloys.
- Metallic bindings. Bands model.
- Metal’s properties. Engineering applications

**Related competencies:**
CE4. Capacity to understand and apply basic knowledge principles of general chemistry, organic and inorganic chemistry and their engineering applications.

**Full-or-part-time:** 13h
Theory classes: 3h
Practical classes: 2h
Guided activities: 2h 30m
Self study: 5h 30m

### TOPIC 3. Ionic binding

**Description:**
- Ionic packaging.
- Solid dissolutions.
- Ionic binding. Reticular energy.
- Properties of ionic compounds. Applications in engineering.

**Related competencies:**
CE4. Capacity to understand and apply basic knowledge principles of general chemistry, organic and inorganic chemistry and their engineering applications.

**Full-or-part-time:** 13h
Theory classes: 3h
Practical classes: 2h
Guided activities: 2h 30m
Self study: 5h 30m
TOPIC 4. Introduction to Organic Chemistry

Description:
- The carbon atom. Simple, double and triple bindings.
- Functional groups. Formulation and nomenclature.
- Constitutional isomerism and stereoisomerism.
- Electronic effects.

Related competencies:
CE4. Capacity to understand and apply basic knowledge principles of general chemistry, organic and inorganic chemistry and their engineering applications.

Full-or-part-time: 22h 30m
Theory classes: 5h
Practical classes: 4h
Guided activities: 3h 30m
Self study: 10h

TOPIC 5. Hydrocarbons

Description:
- Physical properties. Chemical properties.
- Hydrocarbons and derivatives with industrial interest. Acetylene, polyethylene, polypropylene and PVC. Environmental implications.

Related competencies:
CE4. Capacity to understand and apply basic knowledge principles of general chemistry, organic and inorganic chemistry and their engineering applications.

Full-or-part-time: 17h
Theory classes: 4h
Practical classes: 3h
Guided activities: 2h
Self study: 8h

TOPIC 6. Oxygenated and nitrogen compounds

Description:
- Alcohols and ethers. Physical and chemical properties.
- Carbonyl compounds. Physical and chemical properties.
- Carboxylic acids and derivatives. Physical and chemical properties.
- Amines and amides. Physical and chemical properties.
- Products with industrial interest. Polyesters.

Related competencies:
CE4. Capacity to understand and apply basic knowledge principles of general chemistry, organic and inorganic chemistry and their engineering applications.

Full-or-part-time: 28h 40m
Theory classes: 6h
Practical classes: 6h
Guided activities: 2h
Self study: 14h 40m
GRADING SYSTEM

The final mark (NF) will be based on three contributions:
1) Partial Examination mark: EP
2) Continuous Assessment Note: AC
3) Final Exam mark: EF

It will be calculated according to:
NF = max (EF, 0.20 * EP + 0.20 * AC + 0.6 * EF)

The final Reassessment mark will be calculated according to: NF = 1.0 * ReAv

Reassessment Exam mark: ReAv

EXAMINATION RULES.

Both in the continuous assessment tests and in the partial and final exams, and in the re-assessment exams, you must bring a calculator. By no means no notes or forms are available.

BIBLIOGRAPHY

Basic:

Complementary:

RESOURCES

Other resources:
The ATENEA platform will include more information on problems and questionnaires, as well as copies of partial tests and solved final tests.