Course guide
295901 - EII - Industrial Equipment and Installations

Last modified: 04/06/2026

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

Degree: BACHELOR'S DEGREE IN CHEMICAL ENGINEERING (Syllabus 2009). (Optional subject).
BACHELOR'S DEGREE IN ELECTRICAL ENGINEERING (Syllabus 2009). (Optional subject).
BACHELOR'S DEGREE IN INDUSTRIAL ELECTRONICS AND AUTOMATIC CONTROL ENGINEERING (Syllabus 2009). (Optional subject).
BACHELOR'S DEGREE IN MECHANICAL ENGINEERING (Syllabus 2009). (Optional subject).
BACHELOR'S DEGREE IN MATERIALS ENGINEERING (Syllabus 2010). (Optional subject).

Academic year: 2026 **ECTS Credits:** 6.0 **Languages:** Catalan, Spanish

LECTURER

Coordinating lecturer: JOSE IGNACIO IRIBARREN LACO

Others: Primer quadrimestre:
JOSE IGNACIO IRIBARREN LACO - Grup: M1
JORDI SANS MILÀ - Grup: M1

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

Learning based in expositive lessons by using the resources available in Atenea campus and cooperative learning in practice sessions oriented to exercices resolution.

LEARNING OBJECTIVES OF THE SUBJECT

Apply the knowledge of mathematics and electrochemistry to study the corrosion. Dessign equipment and plants in chemical industry with efficiency and economic criteria.

STUDY LOAD

Type	Hours	Percentage
Hours large group	45,0	30.00
Hours small group	15,0	10.00
Self study	90,0	60.00

Total learning time: 150 h

CONTENTS

Introduction. Chemical industry characteristics.

Description:
General characteristics of chemical industry. Equipment and general installations. Associated problematic to the chemical plant.

Specific objectives:
Knowledge of the general characteristics of a chemical industry.

Full-or-part-time: 3h
Theory classes: 2h
Self study : 1h

Thermodynamic basis of the corrosion.

Description:
Electrochemical cells. Nernst equation. Galvanic, concentration and differential aeration cells. Pourbaix diagrams and applications.

Specific objectives:
To obtain the thermodynamic basis of corrosion and apply the Pourbaix diagrams to predict the possibility of corrosion.

Related activities:
Exercices session.

Full-or-part-time: 10h
Theory classes: 4h
Practical classes: 4h
Self study : 2h

Corrosion kinetics.

Description:
Polarization. Evans diagramams and Tafel equations. Passivity. Flade potential.

Specific objectives:
To obtain the kinetics implications in corrosion processes and apply to different factors afectting to corrosion rate.

Related activities:
Exercise session.

Full-or-part-time: 7h
Theory classes: 3h
Practical classes: 2h
Self study : 2h

Types of corrosion. Protection against corrosion.

Description:
Environmental, water, soils and microbiological corrosion. Galvanic, homogeneous and located (pitting) corrosion. Stress corrosion cracking. Cathodic protection, metallic and plastic coatings.
Applications to Chemical Industry.

Specific objectives:
To distinguish the differents types of corrosion related with the morphology and properties of metals and alloys.

Related activities:
Exercice session. Team work and visit to Galvanizados Tenas.

Full-or-part-time: 6h
Theory classes: 2h
Practical classes: 2h
Self study : 2h

Materials properties.

Description:
Metals and alloys. Mechanical and thermal properties. Carbon steels and stainless steels. Non ferrous metals. Specaial alloys. Plastics materials. Reinforced plastics.

Specific objectives:
To study the main properties of materials which can be used in chemical industry.

Related activities:
Exercice session.

Full-or-part-time: 6h
Theory classes: 2h
Practical classes: 2h
Self study : 2h

Materials selection.

Description:
Materials selection criteria. Application to apparatus and equipment of chemical industry.

Specific objectives:
To establish the basis of materials selection criteria in chemical industry.

Related activities:
Exercise session.

Full-or-part-time: 6h
Theory classes: 2h
Practical classes: 2h
Self study : 2h

Costing and project evaluation.

Description:
Investment analysis. Economic evaluation of projects. Total investment cost. Net present worth. Pay back time. Rate of return. Factorial methods of cost estimation applied to chemical equipment.

Specific objectives:
To study preliminarily the investment analysis and associated costing in chemical industry.

Related activities:
Exercise session.

Full-or-part-time: 6h
Theory classes: 2h
Practical classes: 2h
Self study : 2h

Mechanical dessign.

Description:
Pressure vessels under internal and external pressure. Dessign parameters.. Cylinders and spherical shells. Head and closure dessign. Liquid storage tanks. Piping and instrumentation.

Specific objectives:
To study the basis of mechanical dessign of vessels under pressure and storage tanks.

Related activities:
Exercise session.

Full-or-part-time: 6h
Theory classes: 2h
Practical classes: 2h
Self study : 2h

GRADING SYSTEM

Any academic fraud, plagiarism or use or possession of unauthorised means in an assessment activity leads to a mark of zero (0) for the affected test or assignment. Furthermore, in accordance with the University's regulations, if disciplinary proceedings are initiated the subject is recorded as "Pending Assessment" until a decision is reached. These incidents are managed in accordance with the **Action Framework for Academic Integrity in Assessment at the UPC**.

Evaluation system includes:
a) Exercices resolution in continous evaluation (25% of final qualification)
b) Laboratory sesions evaluation (10% of final qualification).
c) Complementary activities like to seminars, expositions and guided works (15% of final qualification).
d) Final examination (50% of final qualification).
Reevalution will replace the qualification of final examen, remaining unchanged the continous evaluation.

EXAMINATION RULES.

Additional material is allowed in examination in accordance with the criteria of the professor.

BIBLIOGRAPHY

Basic:
- Bilurbina, L., Liesa, F., Iribarren, J.I.. Corrosión y protección [on line]. Barcelona: Edicions UPC, 2003 [Consultation: 30/04/2020]. Available on: http://hdl.handle.net/2099.3/36748. ISBN 8483017113.
- Uhlig, Herbert H.. Corrosión y control de corrosión. Bilbao: Urmo, 1970. ISBN 8431401494.
- Sinnott, R. K. Chemical engineering design vol. 6. 5th ed. Oxford: Elsevier Butterworth-Heinemann, 2009. ISBN 9780750685511.

Complementary:
- Talbot, D.; Talbot, J. Corrosion science and technology. Boca Raton: CRC Press, 1998. ISBN 0849382246.
- Peters, Max S.; Timmerhaus, Klaus D. Plant design and economics for chemical engineers. 5th ed. New York: Mc Graw Hill International Editions, 2003. ISBN 9780071240444.