Course guide
820528 - OBA2 - Unit Operations II

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). (Compulsory subject).

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

LECTURER

Coordinating lecturer: ORIOL GIBERT AGULLO

Others:

Primer quadrimestre:
FRANCISCO ESTRANY CODA - Grup: T1
ORIOL GIBERT AGULLO - Grup: T1

Segon quadrimestre:
FRANCISCO ESTRANY CODA - Grup: M1
ORIOL GIBERT AGULLO - Grup: M1
KARINA ALEJANDRA TORRES-RIVERO ANDRADE - Grup: M1

PRIOR SKILLS

Find relevant information in the field of chemical engineering and correct oral and written expression, interpret graphs and diagrams, knowledge of transmission of heat and physicochemical

REQUIREMENTS

OPERACIONS BÀSIQUES I - Prerequisit

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
1. Understand mass and energy balances, biotechnology, mass transfer, separation operations, chemical reaction engineering, the design of reactors, and the recovery and processing of raw materials and energy resources.

Transversal:
2. EFFICIENT ORAL AND WRITTEN COMMUNICATION - Level 3. Communicating clearly and efficiently in oral and written presentations. Adapting to audiences and communication aims by using suitable strategies and means.

TEACHING METHODOLOGY

LEARNING OBJECTIVES OF THE SUBJECT

To Acquire the necessary theoretical knowledge for the calculation and design industrial plants both mass transfer and simultaneous transfer of heat and matter, such as distillation, rectification continuous and discontinuous, solids drying, gas absorption, liquid-liquid extraction, etc..

To acquire analytical skills and ability to use information sources to solve exercises and problems of all these processes and facilities

STUDY LOAD

Type	Hours	Percentage
Hours large group	60,0	40.00
Self study	90,0	60.00

Total learning time: 150 h

CONTENTS

1. Introduction to the operations with mass transfer

Description:
Introduction to the operations with mass transfer. Diffusion. Film and double-film theories. Mass transfer coefficient.

Full-or-part-time: 2h
Theory classes: 2h

2. Distillation

Description:
Distillation. Liquid-vapor equilibrium. Flash distillation. Differential distillation. Rectification distillation. Column calculation. Hydraulic design.

Full-or-part-time: 10h
Theory classes: 10h

3. Air-water interaction

Description:
Humidity, dew point, humid temperature and adiabatic saturation temperature, enthalpy of air-water systems. Psychrometric diagram. Humidification, cooling, etc.

Full-or-part-time: 4h
Theory classes: 4h

4. Cooling towers

Description:
Industrial cooling circuits: open, closed and half open. Differential characteristics between them. Cooling towers: problematic and their specific characteristics.

Full-or-part-time: 4h
Theory classes: 4h

6. Absorption

Description:
Gas-liquid equilibrium. Absorption columns. Calculation and column design.

Full-or-part-time: 8h
Theory classes: 8h

7. Liquid-liquid extraction

Description:
Liquid-liquid extraction of binary mixtures in one stage of equilibrium and in various stages of equilibrium. Specific diagrams. Mass balance and design equations.

Full-or-part-time: 8h
Theory classes: 8h

9. Adsorption

Description:
Adsorption isotherms. Kinetics. Equipment.

Full-or-part-time: 8h
Theory classes: 8h

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**.

BIBLIOGRAPHY

Basic:
- McCabe, Warren L.; Smith, Julian C.; Harriott, Peter. Operaciones unitarias en ingeniería química. 7ª ed. Madrid [etc.]: McGraw-Hill, 2007. ISBN 9701061748.
- Martínez de la Cuesta, Pedro J.; Rus Martínez, Eloisa. Operaciones de separación en ingeniería química. Madrid [etc.]: Prentice Hall, 2004. ISBN 8420542504.
- Treybal, Robert Ewald. Operaciones de transferencia de masa. 2ª ed. México [etc.]: McGraw-Hill, 1988. ISBN 9686046348.
- Ocón García, Joaquín; Tojo Barreiro, Gabriel. Problemas de ingeniería química : operaciones básicas. 3ª ed. Madrid: Aguilar, 1968. ISBN 8403209975.

Complementary:
- Manual del ingeniero químico [on line]. 4ª ed. Madrid [etc.]: McGraw-Hill, 2001 [Consultation: 08/06/2020]. Available on: http://www.ingebook.com/ib/NPcd/IB_BooksVis?cod_primaria=1000187&codigo_libro=6572. ISBN 9788448612788.
- King, C. Judson. Procesos de separación. Barcelona: Reverté, 1980. ISBN 8429173013.
- Vian Ortuño, Ángel; Ocón García, Joaquín. Elementos de ingeniería química : operaciones básicas. 5ª ed. Madrid: Aguilar, 1967. ISBN 8403201532.
- Miranda Barreras, Angel Luis. Aire acondicionado. 5a ed. Barcelona: Ceac, 2004. ISBN 9788432910791.