

## Fluid Dynamics

Code: 102414  
ECTS Credits: 6

**2025/2026**

Degree	Type	Year
Chemical Engineering	OB	2

### Contact

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### Teachers

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### Teaching groups languages

You can view this information at the [end](#) of this document.

### Prerequisites

Convenient to have studied the subject 102405 Mass and energy balance in chemical engineering.

### Objectives and Contextualisation

The main objective is to select and design equipment based on the circulation of fluids existing in any industrial plant.

Other more specific objectives:

- Apply the mechanical energy balance to the study of the fluid flow.
- Study and dimension the equipment for the transport of incompressible fluids.
- Know the necessary instrumentation or based on the fluid flow.
- Expand the application of the mechanical energy balance to the circulation of compressible fluids.
- Understand the foundation of unit operations based on the fluid flow.
- Design the equipment of the most relevant unit operations.

### Competences

- Communication
- Demonstrate knowledge of the different reaction, separation and processing operations for materials, and transport and circulation of fluids involved in the industrial processes of chemical engineering.
- Develop personal attitude.

- Develop personal work habits.
- Develop thinking habits.
- Objectively compare and select different technical options for chemical processes.
- Understand and apply the basic principles on which chemical engineering is founded, and more precisely: balances of matter, energy and thermodynamic momentum, phase equilibrium and kinetic chemical equilibrium of the physical processes of matter, energy and momentum transfer, and kinetics of chemical reactions

## Learning Outcomes

1. Communicate efficiently, orally and in writing, knowledge, results and skills, both professionally and to non-expert audiences.
2. Describe the operations for the transport and circulation of fluids involved in the industrial processes of chemical engineering.
3. Develop a capacity for analysis, synthesis and prospection.
4. Develop curiosity and creativity.
5. Develop independent learning strategies.
6. Efficiently use ICT for the communication and transmission of ideas and results.
7. Identify, analyse and resolve mechanical energy and matter balances.
8. Manage available time and resources. Work in an organised manner.
9. Objectively compare and select different technical alternatives for fluid circulation systems.
10. Work autonomously.

## Content

- 1.- Introduction
- 2.- Incompressible fluids
  - 2.1.- Installations for the transport of fluids
    - 2.1.1.- Pipe fittings and valves
    - 2.1.2.- Materials
  - 2.2.- Balance of mechanical energy
    - 2.2.1.- Simplified forms
    - 2.2.2.- Evaluation of the mechanical energy loss
    - 2.2.3.- Applications of the mechanical energy balance
  - 2.3.- Transportation of incompressible fluids: pumps
    - 2.3.1.- Head and NPSH
    - 2.3.2.- Classification and description of pumps
    - 2.3.3.- Characteristic curve of a centrifugal pump
  - 2.4. Measurers of flow rate and pressure
- 3.- Compressible fluids
  - 3.1.- Balance of mechanical energy
    - 3.1.1.- Isotherm circulation
    - 3.1.2.- Adiabatic circulation
  - 3.2.- Measurers of gas flow rate
  - 3.3.- Transport of compressible fluids
    - 3.3.1.- Classification of equipment: fans, blowers and compressors
    - 3.3.2.- Calculation of the compressor power
- 4.- Operations based on the flow of fluids
  - 4.1.- Circulation of a fluid around a solid
  - 4.2.- Fixed beds
  - 4.3.- Fluidised beds
  - 4.4.- Filtration
  - 4.5.- Sedimentation

## Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Equipment calculation	30	1.2	9
Type: Supervised			
Equipment selection	10	0.4	9
Type: Autonomous			
Problem solving	37	1.48	9, 1, 8
Study	28	1.12	9
Theoretical foundations	25	1	
To find information	8	0.32	9, 2

The fundamentals will be introduced by videos and teaching material.

Class will be dedicated to apply concepts to case studies and to solve questions.

Concepts will be applied also to solve selected problems.

Search of information related to the description of equipment by the students.

During lectures students will complete a numerical project of fluid flow installation.

The communication with students will be through Campus Virtual or e-mail.

For this subject, the use of Artificial Intelligence (AI) technologies is allowed exclusively in [support tasks, such as bibliographic or information searches, text correction or translations, other specific situations in which it is considered]. The student must clearly identify which parts have been generated with this technology, specify the tools used and include a critical reflection on how these have influenced the process and the final result of the activity. The lack of transparency of the use of AI in this assessable activity will be considered a lack of academic honesty and may lead to a partial or total penalty in the grade of the activity, or greater sanctions in serious cases.

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

## Assessment

### Continuous Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Exam block A	30%	2	0.08	2, 3, 7

Examen block B	30%	2	0.08	9, 2, 3, 8, 7
Multiple choice exams about equipments	10%	1	0.04	9, 5, 3, 4, 6, 8
Numerical project	20%	1	0.04	9, 1, 5, 3, 4, 6, 8, 7, 10
Recovery Exam A	30%	2	0.08	9, 2
Recovery Exam B	30%	2	0.08	2, 7
Seminars	10%	2	0.08	2, 3, 8, 7, 10

The subject is divided into two parts: part A (topics 1 and 2), part B (topics 3 and 4)

The activities to be evaluated are:

- A consistent numerical work in designing a simple installation through which a fluid circulates + examination, unrecoverable.
- Test-type tests on team selection formulated through the Virtual Campus, unrecoverable.
- 2 Seminars that consist of solving 1 problem, unrecoverable.
- 2 Partial tests (Ai B)

The final grade will be calculated according to the expression:

Final grade = 30% bloc A + 30% bloc B + 10 % tests + 20% numerical work + 10% seminars

To pass block A and block B you need to get 50% between the theory exam and the problems, otherwise you will have to recover the block not passed.

Each exam will have a theory part and a problem part. Only the problem part will be corrected if a mark greater than or equal to 40% is obtained in the theory part.

After the recovery, to calculate the final grade, you must obtain a minimum of 40% in each of the main items (test A, test B and practicals).

This subject does not include a single assessment system.

#### b) Programming of assessment activities

Evaluable activities will be announced through the Virtual Campus.

#### c) Recovery procedure

No requirements

#### d) Qualification review procedure

For each test and retakes, the day, time and place will be indicated when the notes are published.

#### e) Qualifications

UAB regulations indicate that MH can only be granted to students who have obtained a final grade equal to or higher than 9.00. Up to 5% of MH of the total number of enrolled students can be awarded.

#### f) Irregularities by the student, copying and plagiarism.

Without prejudice to other disciplinary measures deemed appropriate, irregularities committed by the student that may lead to a change in the grade of an assessment act will be graded with a zero. Therefore, copying, plagiarism, deception, allowing copying, etc. in any of the assessment activities will involve failing it with a zero. Assessment activities qualified in this way and by this procedure will not be recoverable. If it is necessary to

pass any of these assessment activities to pass the subject, this subject will be suspended directly, with no opportunity to recover it in the same course.

The copy may be detected during the test, but especially during the correction, so that activity with identical versions will be cancelled.

g) For this subject, the use of Artificial Intelligence (AI) technologies is allowed exclusively in [support tasks, such as bibliographic or information search, text correction or translations and other specific situations in which it is considered]. The student must clearly identify which parts have been generated with this technology, specify the tools used and include a critical reflection on how these have influenced the process and the final result of the activity. The lack of transparency of the use of AI in this assessable activity will be considered a lack of academic honesty and may lead to a partial or total penalty in the grade of the activity, or greater sanctions in serious cases.

## Bibliography

J.M. Coulson, J.F. Richardson Chemical Engineering, V. 1 (1991), V. 6 (1983) Pergamon Press

W.L. McCabe, J.C. Smith, P. Harriot Unit Operations of Chemical Engineering, 4<sup>th</sup> edition. McGraw-Hill Book Company, New York (1985)

E. Costa Novella Ingeniería Química 3. Flujo de fluidos. Alhambra Universidad, Madrid (1985)

R.H. Perry, D. Green Perry's Chemical Engineers' Handbook, 6<sup>th</sup> edition McGraw-hill, New York (1984)

O. Levenspiel Flujo de Fluidos. Intercambio de Calor Ed. Reverté, Barcelona (1993)

F.M. White Fluid Mechanics, 3th edition. McGraw-Hill, New York (1994)

N. de Nevers Fluid Mechanics for Chemical Engineers, 2nd edition. McGraw-Hill, New York (1991)

R. Darby Chemical Engineering Fluid Mechanics. Marcel Dekker, New York (1996)

Robert L. Mott Mecànica de fluidos aplicada, 4<sup>a</sup> edició, Prentice Hall, Mèxico (1996)

Through the library, electronic version is available.

Ch. J. Geankoplis Transport Processes and Unit Operations, 3<sup>a</sup> edició, Prentice Hall, New Jersey (1993)

Teniu disponible el llibre electrònic MECÁNICA DE FLUIDOS 7ED, de Robert Mott que es recomana a l'assignatura Circulació de fluids.

Quan entres des de l'enllaç per anar al llibre, a:

[Ingebook - MECÁNICA DE FLUIDOS 7ED - \(uab.cat\)](http://ingebook - MECÁNICA DE FLUIDOS 7ED - (uab.cat))

Veureu que la coberta del llibre inclou un enllaç al peu que diu: Leer Libro.

Clicant-hi entres al llibre.

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## **Software**

No special software

## **Groups and Languages**

Please note that this information is provisional until 30 November 2025. You can check it through this [link](#). To consult the language you will need to enter the CODE of the subject.