

Course guide

330065 - TMF - Thermodynamics and Fluid Mechanics

Last modified: 07/06/2023

Unit in charge: Manresa School of Engineering
Teaching unit: 750 - EMIT - Department of Mining, Industrial and ICT Engineering.

Degree: BACHELOR'S DEGREE IN CHEMICAL ENGINEERING (Syllabus 2009). (Compulsory subject).
BACHELOR'S DEGREE IN ELECTRICAL ENGINEERING (Syllabus 2009). (Compulsory subject).
BACHELOR'S DEGREE IN INDUSTRIAL ELECTRONICS AND AUTOMATIC CONTROL ENGINEERING (Syllabus 2009). (Compulsory subject).
BACHELOR'S DEGREE IN MECHANICAL ENGINEERING (Syllabus 2009). (Compulsory subject).
BACHELOR'S DEGREE IN MINERAL RESOURCE ENGINEERING AND MINERAL RECYCLING (Syllabus 2021). (Compulsory subject).

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

LECTURER

Coordinating lecturer: Pérez Ràfols, Francesc

Others: RAUL COBO MOLINA

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:

1. Understanding and mastery of the fundamental concepts on the conservative laws of thermodynamics, on the mechanisms of heat transmission and the mechanics of fluids.

Transversal:

2. SELF-DIRECTED LEARNING - Level 2: Completing set tasks based on the guidelines set by lecturers. Devoting the time needed to complete each task, including personal contributions and expanding on the recommended information sources.
3. EFFICIENT ORAL AND WRITTEN COMMUNICATION - Level 2. Using strategies for preparing and giving oral presentations. Writing texts and documents whose content is coherent, well structured and free of spelling and grammatical errors.
4. TEAMWORK - Level 2. Contributing to the consolidation of a team by planning targets and working efficiently to favor communication, task assignment and cohesion.

TEACHING METHODOLOGY

LEARNING OBJECTIVES OF THE SUBJECT

At the end of the course the student must be able to:

- Understand and use the conservative principles of mass, energy and momentum, both transient and permanent stages.
- Understand and use the properties of fluids and the principles of fluid mechanics.
- Solving technical application problems.

STUDY LOAD

Type	Hours	Percentage
Hours small group	30,0	20.00
Self study	90,0	60.00
Hours large group	30,0	20.00

Total learning time: 150 h

CONTENTS

1. Properties and processes of pure and compressible substances.

Description:

Principle of state. P-V-T relations. Ideal gas model. Equations of state.

Specific objectives:

Understand the behavior of pure substances, properties and the processes in which they participate.

Related activities:

Continuous assessment test: Activity 1
Exercises related to the theory: Activity 2
Problem solving and delivery: Activity 3
Assessment test: Activity 4

Full-or-part-time: 40h

Theory classes: 8h
Practical classes: 8h
Self study : 24h

2. Conservative principles.

Description:

Principle of conservation of mass, energy and momentum and its applications in permanent and transient state.

Specific objectives:

Principle of conservation of mass, energy and momentum and its applications in permanent and transient state.

Related activities:

Continuous assessment test: Activity 5
Exercises related to the theory: Activity 6
Problem solving and delivery: Activity 7
Assessment Test: Activity 8

Full-or-part-time: 40h

Theory classes: 8h
Practical classes: 8h
Self study : 24h



3. Principles of fluid mechanics.

Description:

Introduction to fluid mechanics (properties of fluids). Statics of fluids. Dynamics of fluids, application of the principles conservatives. Dimensional analysis.

Related activities:

Continuous assessment test: Activity 9

Exercises related to the theory: Activity 10

Problem solving and delivery: Activity 11

Assessment test: Activity 12

Specific test to assess group work: Activity 13

Full-or-part-time: 40h

Theory classes: 8h

Practical classes: 8h

Self study : 24h

ACTIVITIES

1. CONTINUOUS EVALUATION TEST (ACTIVITIES: 1, 5, 9).

Full-or-part-time: 5h

Practical classes: 2h

Self study: 3h

2. EXERCISE RELATED TO THEORY (ACTIVITIES: 2, 6, 10).

Description:

Completion of exercises on the corresponding theory topics.

Full-or-part-time: 60h

Practical classes: 24h

Self study: 36h

3. SPECIFIC TEST TO ASSESS GROUP WORK (ACTIVITY: 13).

Description:

Group resolution of an applied problem / case specific to the subject.

Full-or-part-time: 5h

Practical classes: 2h

Self study: 3h

4. EVALUATION TEST (Activities 4, 8, 12).

Full-or-part-time: 16h

Practical classes: 6h

Self study: 10h



5. Resolution and delivery of problems (activities: 3, 7 and 11)

Full-or-part-time: 12h

Practical classes: 2h

Self study: 10h

GRADING SYSTEM

Activities 1, 5 and 9: 10% of the final grade.

Activities 2, 6 and 10: 10% of the final grade.

Activities 3, 7 and 11: 5% of the final grade.

Activities 4, 8 and 12: 70% of the final grade.

Activity 13: 5% of the final grade.

BIBLIOGRAPHY

Basic:

- Moran, M. J.; Shapiro, H. N. Fundamentos de termodinámica técnica [on line]. 2ª ed. Barcelona: Reverté, 2004 [Consultation: 10/06/2022]. Available on:

<https://ebookcentral-proquest-com.recursos.biblioteca.upc.edu/lib/upcatalunya-ebooks/detail.action?docID=5635437>. ISBN 8429143130.

- Shames, Irving Herman. Mecánica de fluidos. 3ª ed. Santafé de Bogotá: McGraw-Hill, 1995. ISBN 9586002462.

Complementary:

- Rolle, Kurt C. Termodinámica [on line]. 6ª ed. Acapulco: Pearson Educación, 2006 [Consultation: 03/06/2022]. Available on: https://www-ingebook-com.recursos.biblioteca.upc.edu/ib/NPcd/IB_BooksVis?cod_primaria=1000187&codigo_libro=4691. ISBN 9702607574.

- Mott, Robert L.; Untener, Joseph A. Mecánica de fluidos [on line]. 7ª ed. México: Pearson, 2015 [Consultation: 07/06/2022]. Available on:

https://www-ingebook-com.recursos.biblioteca.upc.edu/ib/NPcd/IB_BooksVis?cod_primaria=1000187&codigo_libro=6180. ISBN 9786073232883.

RESOURCES

Audiovisual material:

- Presentacions al campus digital

Other resources:

Notes in digital campus