Course guide
240630 - 240630 - Distribution Piping Systems

Last modified: 16/05/2023

Unit in charge: Barcelona School of Industrial Engineering
Teaching unit: 729 - MF - Department of Fluid Mechanics.

Degree: BACHELOR'S DEGREE IN INDUSTRIAL TECHNOLOGY ENGINEERING (Syllabus 2010). (Optional subject).

Academic year: 2023 **ECTS Credits:** 4.5 **Languages:** English

LECTURER

Coordinating lecturer: FRANCESC XAVIER ESCALER PUIGORIOL

Others: FRANCESC XAVIER ESCALER PUIGORIOL

PRIOR SKILLS

Fundamentals of Fluid Mechanics

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Transversal:
1. SELF-DIRECTED LEARNING. Detecting gaps in one's knowledge and overcoming them through critical self-appraisal. Choosing the best path for broadening one's knowledge.

TEACHING METHODOLOGY

This course will consist of explanation lectures and sessions for problem solving. The explanation lectures will be used by the teacher to expose and comment with the students the theoretical concepts and equations. The lectures devoted to problem solving will require the student to participate actively and the teacher will provide orientation and support to solve the practical cases.

LEARNING OBJECTIVES OF THE SUBJECT

The objective of the course is that the student learns how to apply in an organized and systematic way the fundamentals that determine the fluid transport inside pipes. With such competences the student must be able to set out and/or resolve a liquid or gas flow system through a pipe net with different complexity. In particular, the student must:
- Identify the type of flow under study and its physical characteristics.
- Understand the equations that govern the pipe flow.
- Solve mathematically permanent incompressible pipe flow.
- Solve transient flow. Predict the water hammer.
- Solve mathematically permanent compressible pipe flow.

STUDY LOAD

Type	Hours	Percentage
Hours medium group	45,0	40.00
Self study	67,5	60.00

Total learning time: 112.5 h

CONTENTS

- FLUID MECHANICS REVIEW

Full-or-part-time: 15h
Theory classes: 3h
Practical classes: 3h
Self study : 9h

- INCOMPRESSIBLE PIPE FLOW

Full-or-part-time: 22h 30m
Theory classes: 4h 30m
Practical classes: 4h 30m
Self study : 13h 30m

- TRANSIENT FLOW. WATER HAMMER

Full-or-part-time: 37h 30m
Theory classes: 7h 30m
Practical classes: 7h 30m
Self study : 22h 30m

- COMPRESSIBLE PIPE FLOW

Full-or-part-time: 37h 30m
Theory classes: 7h 30m
Practical classes: 7h 30m
Self study : 22h 30m

ACTIVITIES

SOLUTION OF WRITING EXERCISES LESSON 1

Full-or-part-time: 6h
Self study: 6h

SOLUTION OF WRITING EXERCISES LESSON 2

Full-or-part-time: 9h
Self study: 9h

SOLUTION OF WRITING EXERCISES LESSON 3

Full-or-part-time: 10h
Self study: 10h

SOLUTION OF WRITING EXERCISES LESSON 4

Full-or-part-time: 10h
Self study: 10h

COMPUTATIONAL SIMULATION CASE 1

Full-or-part-time: 5h
Guided activities: 5h

COMPUTATIONAL SIMULATION CASE 2

Full-or-part-time: 5h
Guided activities: 5h

ATTENDANCE AND PARTICIPATION AT THE CLASSROOM

Full-or-part-time: 22h 30m
Practical classes: 22h 30m

GRADING SYSTEM

Final mark = 0.25*final exam mark + 0.25*solved exercises mark + 0.25*team work mark +0.25*classroom involvement mark

EXAMINATION RULES.

To pass, it is compulsory to obtain a result above zero in at least three of the four partial marks.

BIBLIOGRAPHY

Basic:
- White, F.M. Mecánica de fluidos [on line]. 6a ed. Madrid: McGraw-Hill, cop. 2008 [Consultation: 18/10/2022]. Available on: https://www-ingebook-com.recursos.biblioteca.upc.edu/ib/NPcd/IB_BooksVis?cod_primaria=1000187&codigo_libro=4144. ISBN 9788448166038.
- Streeter, Victor L; Wylie, E. Benjamin; Bedford, Keith W; Saldarriaga, Juan G. Mecánica de fluidos. 9a ed. México: McGraw-Hill, cop. 2000. ISBN 9586009874.
- Shames, Irving Herman; Saldarriaga, Juan G. La Mecánica de los fluidos. 3ª ed. Santafé de Bogotá: McGraw-Hill, cop. 1995. ISBN 9586002462.
- Potter, Merle C. Mecánica de fluidos. 3ª ed. México: Prentice Hall, cop. 2001. ISBN 9706862056.
- Çengel, Yunus A; Cimbala, John M; Fadeeva Sknarina, Sofía. Mecánica de fluidos : fundamentos y aplicaciones [on line]. 2a ed. México, DF: McGraw-Hill, cop. 2012 [Consultation: 04/07/2018]. Available on: http://www.ingebook.com/ib/NPcd/IB_BooksVis?cod_primaria=1000187&codigo_libro=5644. ISBN 9786071507792.
- Gerhart, Philip M; Gross, Richard J; Hochstein, John I. Fundamentos de mecánica de fluidos. 2a ed. Argentina: Addison-Wesley Iberoamericana, cop. 1995. ISBN 0201601052.
- Munson, Bruce Roy; Young, Donald F; Okiishi, Theodore Hisao. Fundamentos de mecánica de fluidos. México: Limusa-Wiley, 1999. ISBN 9681850424.

Complementary:
- Larock, Bruce E; Jeppson, Roland W; Watters, Gary Z. Hydraulics of pipeline systems. Boca Raton, etc: CRC, cop. 2000. ISBN 0849318068.

- Anderson, John David. Modern compressible flow : with historical perspective. 3rd ed. Boston: McGraw-Hill, cop. 2003. ISBN 9780071241366.