Introduction to fluid mechanics

Academic Year: (2022 / 2023) **Review date: 20/06/2022 13:00:38**

Department assigned to the subject: Thermal and Fluids Engineering Department

Coordinating teacher: MORENO BOZA, DANIEL

Type: Compulsory ECTS Credits : 3.0

Year : 3 Semester : 1

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

To take this course it is necessary to have completed the course on Solid and Fluid Mechanics scheduled for the second year.

OBJECTIVES

- Designing protection systems and mobile systems infrastructure under localized impact and explosive charge.
- Plan and perform validation tests protection systems.
- Develop systems to ensure the safety of infrastructure against intrusion.
- Plan infrastructure security installations, existing or new construction.
- Identify potential threats and vulnerabilities of infrastructure.
- Define security plans to harness the technologies implemented in the infrastructure.
- Design oriented systems integration infrastructure for physical protection, combining technologies architectural design and structural protection with electronic and communication technologies.
- Know the basic laws governing fluid motion and know how to apply the analysis of simple problems. Ability to apply dimensional analysis to simplify troubleshooting of fluid mechanics.

- Gain familiarity with the concepts of pressure and viscous stress and its application to the calculation of forces on bodies.
- Understand the fundamental principles of the dynamics of compressible flows, the conservation equations and the most relevant dimensionless numbers.

DESCRIPTION OF CONTENTS: PROGRAMME

Introductory course to the theory of fluid mechanics. After extending the concepts of kinematics to introduce the strain rate tensor, the surface forces appearing in the interior of the fluid media (pressure and viscous stresses) will be presented. The Reynolds transport theorem will then be used to deduce the conservation, or Navier-Stokes, equations (continuity, momentum and energy), which will be applied in integral form to the analysis of simple problems. Finally, there will be an introduction to dimensional analysis, including the Pi theorem and the concept of physical similarity, with simple applications that motivate its usefulness.

ASSESSMENT SYSTEM

% end-of-term-examination/test:	60
% of continuous assessment (assigments, laboratory, practicals…):	40

The assessment system includes the continuous evaluation of the student work (papers, reports of laboratory practice and skills assessment tests of theoretical and practical knowledge) and the final evaluation by a final written of the global knowledge, skills and abilities acquired throughout the course.

BASIC BIBLIOGRAPHY

- 3 - F. M. White Fluid Mechanics (5ª ed), McGraw-Hill, 2004

- 4 - J. H. Spurk Fluid mechanics: problems and solutions, Springer, 1997

- 5 - G. I. Baremblatt Scaling, Self-Similarity and Intermediate Asymptotics, Cambridge University Press, 1996

ADDITIONAL BIBLIOGRAPHY

- B. R. Munson, D. F. Young y T. H. Okiishi Fundaments of Fluid Mechanics, Addison-Wesley Iberoamericana, 2002

- E. J. Shaughnessy Jr., I. M. Katz y J. P. Schaffer Introduction to Fluid Mechanics, Oxford University Press, 2005

- M. Van Dyke An Album of Fluid Motion, The Parabolic Press, 1982

BASIC ELECTRONIC RESOURCES

- National Committee for Fluid Mechanics Films (NCFMF) . Videos clásicos de fluidos : http://web.mit.edu/hml/ncfmf.html