

Course Unit	Advanced Fluid Mechanics		Field of study	Fluid Mechanics and Hydraulics	
Master in	Mechanical Engineering		School	School of Technology and Management	
Academic Year	2023/2024	Year of study	1	Level	2-1
Type	Semestral	Semester	2	ECTS credits	6.0
Code	5071-793-1202-00-23				
Workload (hours)	162	Contact hours	T -	TP 60	PL -
			TC -	S -	E -
			OT -	O -	

T - Lectures; TP - Lectures and problem-solving; PL - Problem-solving, project or laboratory; TC - Fieldwork; S - Seminar; E - Placement; OT - Tutorial; O - Other

Name(s) of lecturer(s) Sérgio Manuel de Sousa Rosa

Learning outcomes and competences

At the end of the course unit the learner is expected to be able to:
 1. To develop a good understanding of the concepts of fluid dynamics and be able to apply at ducts network.
 2. Learn the basis of compressible flows.

Prerequisites

Before the course unit the learner is expected to be able to:
 Use the differential and integral calculus and have knowledge of fluid mechanics

Course contents

Viscous flow in ducts. Compressible flows. Flow in channels and networks. Boundary-layer.

Course contents (extended version)

1. Viscous flow in ducts:
 - Reynolds number. Flow in ducts with circular section and others. Friction losses.
2. Compressible flows:
 - Speed of sound and Mach number. Adiabatic and isentropic flows. Shock-wave.
3. Flow in channels and networks:
 - Multiple-pipe systems. Flow in open channels.
4. Boundary-layer:
 - Geometry and Reynolds number effects. Boundary-layer equations. External flows.

Recommended reading

1. F. M. White. "Fluid Mechanics", McGraw-Hill, 3th ed. , 1994.
2. I. H. Shames. "Mechanics of Fluids", McGraw Hill, 1992.

Teaching and learning methods

Theoretical lessons: Theoretical exposition of the fundamental concepts, followed by presentation of practical applications. Practical lessons: Resolution of problems.
 Work beyond classes: Individual study of the theoretical concepts and resolution of given problems.

Assessment methods

1. Alternative 1 - (Regular, Student Worker) (Final)
 - Intermediate Written Test - 30% (1st written test)
 - Intermediate Written Test - 30% (2nd written test)
 - Laboratory Work - 40% (2 Laboratory works)
2. Exam - (Regular, Student Worker) (Supplementary)
 - Final Written Exam - 100% (Exam)
3. Alternative 3 - (Regular, Student Worker) (Special)
 - Final Written Exam - 100% (Special Exam)

Language of instruction

Portuguese

Electronic validation

Sérgio Manuel de Sousa Rosa	Debora Rodrigues de Sousa Macanjo Ferreira	Luís Manuel Ribeiro Mesquita	José Carlos Rufino Amaro
04-03-2024	04-03-2024	08-03-2024	09-03-2024