Universidad Zaragoza

Academic Year/course: 2023/24

60802 - Fluids Engineering

Syllabus Information

Academic year: 2023/24
Subject: 60802 - Fluids Engineering
Faculty / School: 110 - Escuela de Ingeniería y Arquitectura
Degree: 532 - Master's in Industrial Engineering
ECTS: 4.5
Year: 1
Semester: 532-First semester o Second semester
107-First semester
Subject type: Compulsory
Module:

1. General information

This subject aims to provide the industrial engineer with a solid basis of knowledge and methods to analyse and design facilities in which fluid flow is involved (hydraulic machines, fluid transport facilities, thermal and energy technology, process plants, automotive, building).

The student who takes this subject already knows the fundamentals of fluid mechanics, as well as the tools for flow analysis. The objective of this subject is to provide the student with knowledge and advanced analysis methods that complement their training in order to expand their capabilities in the field of fluid engineering.

These approaches and objectives are aligned with some Sustainable Development Goals, SDGs, of the 2030 Agenda (https://www.un.org/sustainabledevelopment/es/) , specifically Objective 2.3 of Goal 2, Objective 6.4 of Goal 6 and Objective 7.3 of Goal 7.

2. Learning results

Upon completion of this subject, the student will be able to:

Know and apply the methods of analysis and design of hydraulic machines and pumping installations and ventilation.
Know the instrumentation and regulation systems of fluid installations and machines as well as design and select the most suitable systems for each application.
Know the transient phenomena in fluid installations and apply the associated calculation methods.
Know the peculiarities of flows with compressibility effects and analyse relevant compressible flows in fluid machines and facilities.
Understand the acoustic phenomena in fluid installations and machines and apply design and analysis methods related to noise control and generation.
Know the fundamentals of multiphase flows as well as analyse and design applications, including among others, pneumatic transport and particle separation.

3. Syllabus

Module 1: Instrumentation in fluid installations
General Concepts
Pressure measurement
Speed and flow rate measurement
Module 2: multiphase flows
Dynamics of particles in flows
Separation and cleaning equipment
Pneumatic transport facilities
Module 3: compressible flow
Properties of gas flow

Flow in isentropic, isothermal and adiabatic regime. Heat addition
Gas lines. Valves and elements in compressible flow
Module 4: transients in Installations
Characteristic times in fluid installations
Inertia of liquids. Mass oscillations
Fluids and elastic media. Water hammer
Module 5: acoustics
Measurement of sound intensity
Noise generation in fluid installations
Flat waves Reflection and transmission of sound waves
Propagation and attenuation of noise in fluid installations

4. Academic activities

Type I: Master classes (22 hours). The teacher will explain the contents of the subject.

Type II: Problem classes, cases (15 hours). Examples with numerical application of concepts studied through problem solving.

Type III: Practical laboratory and computer classes (8 hours). Application of learned concepts through experimental installations or computer simulations.

Type VI: Subject works (30 hours) that expand or develops topics discussed in class.

Type VII: Personal study (45 hours). It is fundamental in the student's learning process and to pass the assessment activities.

Type VIII: Final assessment (5 hours)

Tutorials (4 hours)

5. Assessment system

The student must demonstrate that they has achieved the expected learning results by means of the following assessment activities

Option 1: Continuous assessment
The assessment will be carried out through partial tests that will be scheduled throughout the semester as well as practices and assignments. About 2 partial tests will be conducted (the exact number will be specified at the beginning of the academic year), which will consist of written tests on the contents developed in the theory sessions and in the problem and practical sessions.
The final grade will be calculated as an average of these partial tests (90% of the grade) along with practice reports (10% of the grade) and subject assignments (additional score).

Option 2: Global assessment
A comprehensive final written exam on the contents developed in the theory classes as well as the practices and problem sessions that will make up 100% of the final grade and will be carried out at the place and date indicated by the centre, after the end of the teaching period, for each of the two calls.