Universidad Zaragoza

Academic Year/course: 2023/24

29724 - Thermal Engineering

Syllabus Information

Academic year: 2023/24
Subject: 29724 - Thermal Engineering
Faculty / School: 110 - Escuela de Ingeniería y Arquitectura
Degree: 330 - Complementos de formación Máster/Doctorado
434 - Bachelor's Degree in Mechanical Engineering
ECTS: 6.0
Year: 434 - Bachelor's Degree in Mechanical Engineering: 3
330 - Complementos de formación Máster/Doctorado: XX

Semester: First semester
Subject type: 434 - Compulsory
330 - ENG/Complementos de Formación
Module:

1. General information

The subject has been conceived as a continuation of the subject of technical thermodynamics and fundamentals of heat transfer , delving into the phenomenology and basic principles of heat generation and transport in stationary and transient situations . The student will become familiar with the methodology of thermal engineering to approach, analyze, model and simulate energy equipment and installations that are important in industry and at an economic and social level: boilers, heat exchangers, solar collectors, etc.

These approaches and objectives are aligned with some of the Sustainable Development Goals, SDGs, of the 2030 Agenda () and certain specific targets, particularly targets 7.2 and 7.3 of the 2030 Agenda (https://www.un.org/sustainabledevelopment/es/) and certain specific targets, in particular targets 7.2 and 7.3 of goal 7, target 9.4 of goal 9 and target 11.6 of goal 11, as well as 12.2 of Goal 12.

2. Learning results

Understand the basic mechanisms of heat transport in stationary and transient situations and apply the appropriate analytical calculation tools.

Be fluent in the use of simple computer tools for the calculation with numerical methods of heat transfer in transient and steady state and evaluates the results.

Understand the usual procedures to produce heat, analyze the behavior of the corresponding equipment and apply the appropriate calculation tools to perform simple calculation models.

3. Syllabus

PART I - HEAT TRANSFER

1 - Introduction to Heat Transfer

Driving

2 - Fundamentals of heat conduction: Fourier's Law, EDC

3 - One-dimensional and stationary conduction. Fins

4 - 2-D and 3-D stationary conduction. Numerical methods

5 - Transient conduction

Convection

6 - Fundamentals of heat convection

7 - External forced convection

8 - Indoor forced convection

9 - Heat exchangers

10 - Natural convection

11 - Two-phase convection

Radiation

12 - Fundamentals of radiation

13 - Radiative exchange between surfaces

PART II - HEAT PRODUCTION

1 - Thermochemistry of combustion. Boilers

4. Academic activities

Lectures: Sessions with the teacher where the syllabus will be explained and practical examples will be given 30 hours Problem solving and case studies: Practical sessions where problems related to theoretical concepts are solved. 15 hours

Simulation and laboratory practices: Computer simulation exercises, accompanied by experimental data collection in some cases, of thermal systems. 15 hours

Study and personal work: Preparation of classes, exercises, etc. : 84 hours.

Assessment tests. 6 hours

5. Assessment system

There will be a single overall assessment procedure, which will consist of:

-practical activities: it will represent 20% of the course, and will consist of the evaluation of the delivery of the practical scripts, as well as the previous preparation, and the performance shown in them.

-a written examination of an eminently practical nature, to be taken during the official examination period. The final grade will be 80% of the total evaluation, requiring a minimum of 4/10 in the exam to pass the subject.

The grade of the practical activities is maintained during the registration, and otherwise in the written exam may include questions related to them with up to 20% of the total value.