

Course guide

310773 - 310773 - Thermography for Building Diagnostics

Last modified: 06/11/2023

Unit in charge: Barcelona School of Building Construction
Teaching unit: 758 - EPC - Department of Project and Construction Engineering.

Degree: BACHELOR'S DEGREE IN ARCHITECTURAL TECHNOLOGY AND BUILDING CONSTRUCTION (Syllabus 2019).
(Optional subject).

Academic year: 2023 **ECTS Credits:** 3.0 **Languages:** Catalan

LECTURER

Coordinating lecturer: Tejedor Herran, Blanca

Others: Tejedor Herran, Blanca

TEACHING METHODOLOGY

This is a practical subject in which students will learn and implement a non-destructive technique for building diagnosis such as infrared thermography through real case studies. This includes the analysis of the thermal behavior of the building elements, the preventive and corrective maintenance of facilities and the evaluation of the thermal comfort of users in interior spaces among others.

LEARNING OBJECTIVES OF THE SUBJECT

The main objective of this subject is to establish a useful guideline for the student. He or she should be able to detect anomalies and determine the thermal properties of construction elements. In this way, the student can propose improvements regarding building refurbishment or facility management.

STUDY LOAD

Type	Hours	Percentage
Self study	45,0	60.00
Hours large group	30,0	40.00

Total learning time: 75 h

CONTENTS

Modul I. Introduction to infrared thermography (IRT)

Description:

- Context
- Energy audit process (legislative framework, key concepts and inspection instruments)
- Fundamentals of IRT technology (definition of the technology, brief history of IRT in the construction sector, qualitative and quantitative thermographic inspection)
- Applications of thermography (theoretical and practical examples in materials science, biomedicine, engineering and architecture in order to detect anomalies in elements or bodies that are known to students)
- Legislative framework of the IRT in Europe and Spain
- Measurement equipment (definition of the key concepts related to the thermographic camera)
- Heat transfer processes in relation to the IRT (visual identification of the processes of radiation, conduction and convection in several IRT examples)

Specific objectives:

The main aim is to assimilate the basic foundations of this non-destructive diagnostic technique.

Related activities:

- Mindmap on sustainability and architecture
- Identification of the contents of an energy audit to know the instruments used during an inspection
- EU initiatives to refurbish buildings
- Analysis of specific cases of IRT application
- Initial practice with the IRT camera and the software in the classroom

Full-or-part-time: 32h

Theory classes: 10h

Guided activities: 12h

Self study : 10h

Module II. Thermography for building diagnosis

Description:

- Measurement and Assessment techniques
- Basic aspects to know how elaborate IRT reports
- Interpretation of thermograms: Qualitative IRT vs. Quantitative IRT
- IRT for preventive and corrective maintenance of building facilities
- IRT for building refurbishment
- IRT for the analysis of the thermal comfort of the user inside the buildings

Specific objectives:

The aim is to help the student learn how to implement thermography in domains related to his/her field, such as: the maintenance of facilities, the rehabilitation of the building given certain pathologies, and indoor thermal comfort of building users. The student should be able to propose solutions and improvements to the detected problems, applying different measurement and analysis techniques.

Related activities:

- Calibration of IR camera and characterization of materials
- Detection of pathologies of constructive elements (from inside to outside the building)
- Preventive and corrective maintenance of facilities
- User thermal comfort detection
- Elaboration of thermographic reports
- Thermographic inspection of a UPC building

Full-or-part-time: 43h

Theory classes: 16h

Practical classes: 14h

Guided activities: 5h

Self study : 8h

GRADING SYSTEM

The grading system is divided into three parts:

- Short concept assimilation exercises (CAE): 20%
- Supervised activities (SA): 40%.
- Practices (PR): 40%

There is no final exam for the subject.

RESOURCES

Other resources:

Material uploaded in Atenea