

# **Thermal and Acoustics rehabilitation of buildings:**

**Calendar:** 2nd Year 2nd Semester

**Contact Hours:** 45h00T/P+7H30 OT

## **Syllabus:**

**Thermal in Buildings:** Study and detailed analysis of the national regulation (RCCTE and SCE). Thermal rehabilitation of buildings. Preparation and discussion of thermal behavior design of new and existing buildings.

**Acoustics in Buildings:** Detailed study and analysis of the requirements of national regulation (RRAE). Comfort and sound interventions. Preparation and discussion of acoustic design for new and existing buildings.

**Natural Ventilation in Buildings:** Criteria and principles of natural ventilation. Preparation and discussion of design for natural ventilation of buildings according to standards and recommendations.

## **Intended learning outcomes of the curricular unit:**

This course aims to introduce students in the activity of thermal and acoustics buildings' design for new buildings or existing buildings subject to retrofitting. Principles and design of natural ventilation are also introduced for residential buildings.

It is an introduction to professional practices in these areas, enabling students to analyze and devise appropriate solutions to each type of intervention: new construction or rehabilitation.

## **Demonstration of the syllabus coherence with the curricular unit's intended learning outcomes:**

This course begins with a brief review of the generalities of thermal on buildings and national regulation (DL 80/2006). After this review, we intend to introduce students to the various details of the application that Agency for Energy (ADENE) has been clarified through their technical documents to support designers and experts. After these concepts are absorbed will be analyzed various cases of practical application, giving particular emphasis to the methodologies and intervention solutions in existing buildings, and aspects such as thermal inertia, the compatibility with the existing architecture and budgets. Students will consolidate their knowledge through the completion of a thermal design of an existing building.

The building acoustics constitute the second chapter of the discipline. A brief review of concepts, generalities and legislation - DL 96/2008 will be performed. Several case studies will be analyzed, especially related to existing buildings, including the acoustic treatment of constructive elements as well as treatment of noise from electromechanical equipment. The sound quality of spaces and ensure intelligibility of sound, will also be addressed, optimizing solutions that address several performances. Students will consolidate their knowledge through the completion of an acoustics design on a building.

The third and most succinct chapter, discusses the importance of natural ventilation, its design and implementation in new and existing buildings, is highlighting its connection to RCCTE.

Students will be alerted to the need for compatibility of thermal, acoustic and natural ventilation needs in buildings.

## **Teaching methodologies (including evaluation):**

Teaching methodology:

Theoretical and practical lectures and activities of e-learning

After presentation of concepts and methodologies by the teacher, students will carry out projects with some autonomy, functioning the teacher as advisor.

Evaluation:

A written test and two projects: thermal and acoustic. Approval is required for the minimum of 9.5 in any evaluation. The final grade is obtained by taking the weight 0.6 for the written test and 0.25 and 0.15 for thermal and acoustic projects, respectively.