

## Thermal and Acoustics Rehabilitation of Buildings

Academic Year:

**2018/2019**

Course	Master's degree in Conservation and Rehabilitation								
Scientific Area	Conservation and Rehabilitation								
ECTS Credits	6,0	Curriculum Unit code	RTAE	Year	1	Semester	2	Type	Compulsory
Prerequisites									
<b>Contact Hours:</b>									
Lecture Sessions		Lecture-Practical Sessions	45	Practical and Laboratory Sessions					
Tutorial		Placement		Seminar					
Fieldwork		Other	7,5	Autonomous Study	109,5				
Responsible	Susana Maria Melo Fernandes Afonso Lucas			Position	Visiting Adjunct Professor				
Lecturers				Position					
Learning Outcomes	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.								
Syllabus	Chapter 1 – Thermal in Buildings Study and detailed analysis of the national regulation (REH and SCE). Thermal rehabilitation of buildings. Preparation and discussion of thermal behavior design of new and existing buildings. Chapter 2 – 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. Chapter 3 - 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.								
Teaching Methodologies	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	The assessment consists of a written test and two projects: thermal behaviour and acoustic conditioning. For approval, a minimum grade of 9.5 is required in any of the evaluation components. The final grade is obtained considering the weight 0.6 for the written test and the weights 0,25 and 0,15 for the projects of thermal behaviour and acoustic conditioning, respectively.								

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**Evidence of the syllabus coherence with the curricular unit's intended learning outcomes**

The CU begins with a succinct review of the thermal of buildings and REH. Several practical application cases will be analyzed, highlighting the methodologies and intervention solutions in existing buildings, taking into account aspects such as thermal inertia, compatibility with existing architecture and costs. A brief review will be made of acoustic concepts and legislation - DL 96/2008. Sound isolation, noise treatment from electromechanical equipment and treatment strategies of the building elements are analyzed. The third and more succinct chapter deals with the importance of natural ventilation, its design and implementation in new and existing buildings, emphasizing its connection to REH. Students will be alerted to the need for compatibilization of the Thermal, Acoustics and Natural Ventilation projects.

**Evidence of the teaching methodologies coherence with the curricular unit's intended learning**

The teaching methodology adopted in this CU provides the student with an overview of the problem and then through the development of projects consolidates, deepens and prepares for professional practice. The implementation of the projects that constitute evaluation of the discipline, counts on the orientation and the accompaniment of the teacher, stimulating the capacity to research, analyze, evaluate and propose solutions. The e-Learning activities can be asynchronous in order to stimulate the research, analysis, evaluation and search of solutions or synchronous, in order to follow the development of the projects. This methodology motivates and prepares the students in the acquisition of the defined competences in the understanding of the concepts and their practical application.

**Bibliography**

A. Moret Rodrigues, A. Canha da Piedade e Ana Marta Braga, "Térmica de Edifícios", 1ª edição, Edições Orion, Amadora, 2009.  
René Vitonne, "Bâtir - Manuel de la Construction" PPUR, Lausanne, 1996.  
P. Martins da Silva, "Acústica de Edifícios", LNEC, Lisboa, 1978. P. Martins da Silva, "A componente acústica na reabilitação de edifícios de habitação", LNEC, Lisboa, 1998.  
Jorge Patrício, "Acústica nos Edifícios", 6ª edição, Verlag Dashofer, Lisboa, 2010.  
Jorge Patrício - "Reabilitação Acústica, Linhas Guia" - 2ª Edição, Verlag Dashofer, 2010.  
João Carlos Viegas (1995). Ventilação natural de edifícios de habitação, LNEC NP 1037-1. Ventilação e evacuação dos produtos da combustão dos locais com aparelhos a gás.  
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**Observations**