

Curricular Unit Form (FUC)

Course:	FIRST CYCLE IN MECHANICAL ENGINEERING					
Curricular Unit (UC)	Energy Audits				Mandatory	
					Optional	X
Scientific Area:	Energy and Systems Control					
Year: 1º	Semester: 2º	ECTS:5,0		Total Hours: 3,0		
Contact Hours:	T:	TP:45	PL:	S:	OT:	TT:
Professor in charge		Academic Degree /Title		Position		
Nuno Paulo Ferreira Henriques		Master of Science		Associate professor		

T- Theoretical ; TP – Theory and practice ; PL – Laboratory ; S – Seminar ; OT –Tutorial ; TT – Total of contact hours

Entry into Force	Semester: Winter	Academic Year: 2016/2017
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Objectives of the curricular unit and competences (max. 1000 characters)

The aim of this course is to provide students with a set of basic knowledge enabling them to understand the importance and meaning of energy management, developing technical competences about energy efficiency and power rational use.

It is intended that students know the basic rules applicable to the Intensive Consumption Management Energy field and have the capacity to execute energy auditings aiming the use of energy in buildings an industrial plants and promote the increase of energy efficiency.

Students should acquire basic skills enabling them:

- to make the correct interpretation of national regulation about energy management;
- to analyse data about energy consumptions;
- to plan, execute and interpret results from an energy auditing;
- to define strategies leading power rational use, plan and implement action lines and evaluate the solutions quality and efficiency;
- to define, implement and use energy management systems.

Syllabus (max. 1000 characters)

Standards and Rules for Buildings' Energy Systems: Portuguese and european community standards and rules related with energy, buildings' energy efficiency, promotion of renewable energies and gas and electricity markets.

Energy Auditings: Energy auditing: main goals, different types, phases, design, planning and execution. Measuring equipments. Energy auditing reports. Energy costs and consumptions analysis. Identification of power rational use measures.

Energy Consumption Rationalization Plan: Energy Consumption Rationalization Plan: main goals and phases. Power

Curricular Unit Form (FUC)

rational use measures. Energy consumption monitorisation. Rationalization Plan Reports.
Buildings' Energy Management: Energy management system use and development methodologies.
Technical management systems. Supervision, control and use of building's technical installations.

Demonstration of the syllabus coherence with curricular unit's objectives (max. 1000 characters)

Each basic skill that should be acquired by students is directly linked with each course main theme. Skills could be acquired by lectures and practical classes assistance and by the execution of a set of pedagogically fundamental activities for continuous evaluation, each one related with one course main theme.

Teaching methodologies (including evaluation) (max. 1000 characters)

Beyond guided visits to important technological buildings, the course teaching is based on lectures and practical classes. Students are motivated to take an active approach on search of basic information and on solving practical problems.

In order to successfully complete the course, students must succeed a set of pedagogically fundamental activities for continuous evaluation, in small groups, consisting on two small projects (75%) and a public presentation related with a course theme (25%).

The continuous evaluation activities are compulsory and their classifications are minimum values of 10. Individual oral examination can be requested if necessary.

Demonstration of the teaching methodologies coherence with the curricular unit's objectives (max. 3000 characters)

resolution of practical problems, allowing students to acquire the expertise needed to plan, execute and interpret

results of energy auditing and do the appropriate energy management of buildings and industrial plants; Guided visits to important services buildings allow to observe and listening to explanations about the existing energy management systems installed in such buildings and to discuss the strategies and action lines implemented by theirs energy managers, aiming to show to the students the solutions used.

The continuous evaluation depends on the group mark of continuous evaluation activities and individual performance along the classes, guided visits and public presentations, taking into account the communications skills – oral while answering questions during the activities and public presentations or written on the reports

Main Bibliography (max. 1000 characters)

Ramage, Janet, Guia d a Energia, Editora Monitor, 1997;

Curricular Unit Form (FUC)

Sá, A. F. Ribeiro, Guia de Aplicações de Gestão de Energia e Eficiência Energética, Publindústria, 2008;
Centro para a Conservação de Energia, Manual do Gestor de Energia, Lisboa, 1997;
Centro para a Conservação de Energia, Auditorias Energéticas, Lisboa, 1997;
Bradshaw, V., Building Control Systems, John Wiley & Sons, Inc., 1993;
Wulfinghoff, Donald R., Energy Efficiency Manual, Energy Institute Press, 1999;
Barney Capehart, Wayne Turner & William Kennedy, Guide to Energy Management, The Fairmont Press, 2002;
Applicable national and european legislation.