

**Curricular Unit Form (FUC)**

Course:	<b>FIRST CYCLE IN MECHANICAL ENGINEERING</b>					
Curricular Unit (UC)	<b>Air Conditioning Basics</b>				Mandatory	<b>X</b>
					Optional	
Scientific Area:	<b>Termofluids and Energy</b>					
Year: 3 <sup>o</sup>	Semester: 1 <sup>o</sup>	ECTS:5,5		Total Hours: 148,5		
Contact Hours:	T:	TP:67,5	PL:	S:	OT:	TT: 67,5
Professor in charge		Academic Degree /Title		Position		
Cláudia S. Séneca L. Casaca		Doctor of Philosophy		Assistant 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: 2019/2020
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**Objectives of the curricular unit and competences** (max. 1000 characters)

**Objectives:**

The main objective of this curricular unit is to introduce the fundamentals of air conditioning. Each studied chapter will make use of application examples related with the related subjects.

**Specific Skills:**

The skills to be acquired by students throughout the semester will allow a physical understanding of the particular phenomena present in a air conditioning system, their effects, the required calculations needed to quantify them and the way how requested conditions are obtained.

**Syllabus** (max. 1000 characters)

**1. Fundamental concepts**

Properties of wet air as a mixture of perfect gases.

Psychrometric and Mollier chart for wet air.

**2. Processes**

Sensible cooling and heating.

Humidification with steam.

Cooling with humidification.

Cooling with dehumidification.

**3. Cooling Loads**

External and internal conditions.

Sensible load.

Latent load.

Sensible heat factor.

**4. Approach to air conditioning technology**

Individual systems.

Central systems.

DX central systems.

**5. Program of the Practical Works**

“AHU” technology and tests with application of related relations.

Cooling load calculation without software resource.

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

This Curricular Unit aims to provide students with HVAC knowledge to determine the thermal loads from one place to air condition, and the domain of the techniques to use, in order to obtain the required environmental conditions at that location, taking into account the applied rules for comfort conditions, environmental hygiene and the associated energy consumption.

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

This Curricular Unit has both theoretical and practical components.

The methodology of teaching intends to be eclectic, so it contemplates expositive lectures, exercises designed to apply the knowledge related to the contents and an oral or a written work performed by the students contemplating the experimental application of the acquired knowledge.

The assessment is carried out by means of a Exam (80%) plus 2 practical works. (20%).

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

The teaching methodology allows students an easy progress in learning the Air Conditioning, providing the scientific bases which will be used in a graduation curricular unit: Air Conditioning Equipment Technologies and in a Master curricular unit: Special Technical Installations.

**Main Bibliography** (max. 1000 characters)

Folhas de Climatização Geral, João Frade / Francisco Severo.

ASHRAE Handbook – Fundamentals. ASHRAE Research Edition

Manual de Aire Acondicionado. Carrier International Limited. Marcombo.

Coeficientes de transmissão térmica de elementos da envolvente dos edifícios 2006 (ITE 50; LNEC)

António José da Anunciada Santos. AVAC, Um Manual de Apoio: Fundamentos. Engebook.

António José da Anunciada Santos. Refrigeração I – Fundamentos. Manual de apoio ao ensino e à profissão - Complementos. Engebook.