

## 28813 - Thermal Engineering and Energy Technology

### Información del Plan Docente

Academic Year	2017/18
Faculty / School	175 - Escuela Universitaria Politécnica de La Almunia
Degree	424 - Bachelor's Degree in Mechatronics Engineering
ECTS	6.0
Year	2
Semester	Second semester
Subject Type	Compulsory
Module	---

### **1.General information**

#### **1.1.Introduction**

#### **1.2.Recommendations to take this course**

#### **1.3.Context and importance of this course in the degree**

#### **1.4.Activities and key dates**

### **2.Learning goals**

#### **2.1.Learning goals**

#### **2.2.Importance of learning goals**

### **3.Aims of the course and competences**

#### **3.1.Aims of the course**

#### **3.2.Competences**

### **4.Assessment (1st and 2nd call)**

#### **4.1.Assessment tasks (description of tasks, marking system and assessment criteria)**

### **5.Methodology, learning tasks, syllabus and resources**

#### **5.1.Methodological overview**

**The learning process designed for this subject is based on the following:**

The current subject Thermal engineering and energy technology is conceived as a stand-alone combination of contents, yet organized into three fundamental and complementary forms, which are: the theoretical concepts of each teaching unit, the solving of problems or resolution of questions and laboratory work, at the same time supported by other activities.

### 5.2. Learning tasks

The programme offered to the student to help them achieve their target results is made up of the following activities...

Involves the active participation of the student, in a way that the results achieved in the learning process are developed, not taking away from those already set out, the activities are the following:

- **Face-to-face generic activities :**

- \* **Theory Classes .**
- \* **Practical Classes.**
- \* **Laboratory Workshop .**

\* **Seminars.**

- **Generic non-class activities:**

- \* Study and understanding of the theory taught in the lectures.
- \* Understanding and assimilation of the problems and practical cases solved in the practical classes.
- \* Preparation of seminars, solutions to proposed problems, etc.
- \* Preparation of laboratory workshops, preparation of summaries and reports.
- \* Preparation of the written tests for continuous assessment and final exams.

### 5.3. Syllabus

The program of the subject includes eight topics:

#### THEORETICAL CONTENTS

- 1 Introductory concepts and definitions.
- 2 Energy and the first law of Thermodynamics.
- 3 Properties of a pure, simple compressible substance.
- 4 Control volume energy analysis.
- 5 The second law of Thermodynamics and Entropy.
- 6 Vapor power systems.
- 7 Refrigeration and heat pump systems.

#### PRACTICAL CONTENTS

Some topics discussed in the previous section have associated laboratory practices in this regard. As the topics are developed, these Practices will be presented, both in the classroom and through the Moodle platform.

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Following are those practices to be developed in the laboratory that will be carried out by the students in sessions of 2 hours duration.

Practice 1: Heat pump.

Practice 2: Thermal insulation.

Practice 3: Thermohygroscopy.

### CONTENTS SEMINARS

Thermal solar energy. Introduction. Solar Collectors. Elements of an installation. Applications. Calculation of facilities.

### 5.4.Course planning and calendar

The dates of the final exams will be those that are officially published at <http://www.eupla.es/secretaria/academica/examenes.html>.

The written assessment tests will be related to the following topics:

- Test 1: Topics 1, 2, 3 and 4.
- Test 2: Topics 5, 6 and 7.

### 5.5.Bibliography and recommended resources

THE UPDATED BIBLIOGRAPHY OF THE SUBJECT IS CONSULTED THROUGH THE LIBRARY WEB PAGE:

<http://psfunizar7.unizar.es/br13/eBuscar.php?tipo=a>

Bibliografía principal:

\* Moran, Michael J. Fundamentos de termodinámica técnica / Michael J. Moran Howard N. Shapiro. - 2ª ed. En español Barcelona [etc.]: Reverté, D.L. 2004.

Bibliografía de apoyo:

\* Agüera Soriano, José. Termodinámica lógica y motores térmicos / José Agüera Soriano. - 6a. ed. mejorada Madrid: Ciencia 3, D.L. 1999.

\* Cengel, Yunus A.. Termodinámica / Yunus A. Cengel, Michael A. Boles ; traducción, Víctor Campos Olguín, María Teresa Colli Serrano ; revisión técnica, Luis G. Ríos Casas, Missael Flores Rojas . - 4ª ed. en español Mexico [etc.]: McGraw-Hill, cop. 2003.

\* Velasco Callau, María Carmen. Termodinámica técnica / Carmen Velasco Callau, Amaya Martínez Gracia y Tomás Gómez Martín . - 1ª ed. Zaragoza: Prensas Universitarias de Zaragoza, 2010.

\* Segura Clavell, José. Termodinámica técnica / Jose Segura Clavell Barcelona [etc.]: Reverté, D. L.1999.

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\* Mills, Anthony F. Transferencia de calor / Anthony F. Mills; versión en español de Sergio de Régules Ruiz-Funes, con la colaboración técnica de Eduardo Muñoz Tomás y Víctor Hugo del Valle Muñoz Barcelona [etc.]: Irwin, D.L. 1995

### **Resources**

#### **Materials.**

Topic theory notes Paper/repository

Topic problems

Topic theory notes

Topic presentations Digital/Moodle

Topic problems E-Mail

Related link

Educational software Web page