

## 30206 - Physics and electronics

### Syllabus Information

**Academic year:** 2024/25

**Subject:** 30206 - Physics and electronics

**Faculty / School:** 110 - Escuela de Ingeniería y Arquitectura

326 - Escuela Universitaria Politécnica de Teruel

**Degree:** 439 - Bachelor's Degree in Informatics Engineering

443 - Bachelor's Degree in Informatics Engineering

**ECTS:** 6.0

**Year:** 1

**Semester:** Second semester

**Subject type:** Basic Education

**Module:**

### 1. General information

The main objective of this subject is that the student understands the fundamental physical magnitudes and laws that govern the operation of computer systems at the physical level. It is expected that students will obtain at the end of this subject the sufficient basis for the understanding of hardware and its continuous training, so necessary in such a dynamic field as information technologies.

In order to know and understand these physical phenomena, knowledge of mathematics such as basic operations with vectors and the calculation of derivatives and integrals is necessary, as well as basic knowledge of high school physics.

There is no relationship between these approaches and objectives and any of the Sustainable Development Goals (SDGs) of the 2030 Agenda.

### 2. Learning results

In order to pass this subject, the students shall demonstrate they has acquired the following results:

Know the main properties of electric and magnetic fields, the classical laws of electromagnetism that describe and relate them, their meaning and their experimental basis in basic ingeneering problems.

Know and uses the concepts related to capacitance, electric current, self-induction and mutual induction, as well as basic electrical and magnetic properties of materials .

Understand oscillating phenomena, know their differential equation, as well as their solutions.

Know the wave equation, the characteristic parameters of its basic solutions and the energetic aspects of them. Use and understand the properties of electromagnetic waves and their spectrum, the basic phenomena of propagation and the basic aspects of light-matter interaction.

Describe the concept of signal and the different electrical forms with which information can be represented.

Solve simple electrical circuits in direct current and permanent regime and identifies adequately the most relevant time response parameters of first order circuits in the presence of input steps.

Describe the principle of operation of basic semiconductor devices (diode and transistor) and solves simple problems based on them.

Describe the concept of logical family.

Identify the structure and fundamental characteristics of the most widely used digital technology.

Describe the implementation strategy of the main logic gates and solves basic technological problems.

### 3. Syllabus

EINA:

Part I: Electromagnetism

Unit 1: Electrostatics. Electric field and potential

Unit 2: Electric current

Unit 3: Magnetism  
Part II: Circuit theory  
Unit 4: Direct current circuits  
Part III: Electronics  
Unit 5: Analog electronics  
Unit 6: Digital electronics

**EUPT:**

Electric field  
Electrical properties of matter. Resistors and capacitors  
Magnetic field  
Magnetic properties of matter. Coils  
Electromagnetic waves. Signals and information transmission  
Electrical circuits: Fundamentals. Voltage and current laws  
Techniques for the analysis of resistive circuits  
Basic circuits with capacitors and coils  
Resistive circuits with sinusoidal sources  
Fundamentals of electrical installations  
Fundamentals of electronics: Diode and transistor  
Logical families: TTL and CMOS

#### **4. Academic activities**

The subject is divided into 3 blocks, which are distributed as follows:

5 weeks dedicated to electric field and oscillations  
5 weeks dedicated to electrical circuits  
5 weeks dedicated to electronic devices

On a weekly basis, the teaching organization of the subject is as follows:

Theoretical classes (3 hours per week). These class hours will alternate lectures, analysis and resolution of problems.  
Practical classes (6 sessions of 2 hours every 2 weeks)

The schedule of exams, as well as the dates for handing in papers and practice scripts will be announced well in advance.

#### **5. Assessment system**

The subject will be assessed by the continuous assessment system by means of the following activities:

**A) EINA:**

Evaluation of the practicals (15%), which will be evaluated by means of the report with the answers to the questions posed in the script of each practice and a multiple-choice questionnaire to be carried out at the end of each practicum.

Partial test of part I (15%), to be taken throughout the term.

Final exam of parts II and III (70%).

**B) EUPT:**

Practices assessment (10%)

Other evaluable activities (10%).

Final exam of the whole syllabus (80%).

**COMMON TO THE EINA AND EUPT**

In both cases (EINA and EUPT), a minimum score of 4 out of 10 is required for the final exam. If the student does not exceed the minimum grade of the final exam (4 out of 10), the final grade will be the minimum between 4 and the weighted grade. In case of having missed one or more laboratory practices, the evaluation of this activity will be done through a practical exam in the laboratory on the date of the call, which will be worth 20% of the overall grade, corresponding to the written exam of theory and problems of the whole course the remaining 80%.

In the first call, students may opt for the evaluation by means of a global test consisting of a written exam of theory and problems of the whole subject, which will be worth 80%, and a practical exam in the laboratory, which will be worth 20%.

In the second call, the assessment will be by means of a global test, consisting of a written exam of theory and problems of the whole subject, which will represent 80%, and a practical exam which will be worth 20%.

In all cases in which a practical exam must be taken, in order to pass the subject the minimum grade will be 4 out of 10 both in the practical exam as in the written theory and problems exam; If a lower grade is obtained in either of the two exams, the final grade will be the minimum between 4 and the weighted grade.