Universidad Zaragoza

**Academic Year/course: 2021/22**

# 28806 - Physics II

## Syllabus Information

**Academic Year:** 2021/22
**Subject:** 28806 - Physics II
**Faculty / School:** 175 - Escuela Universitaria Politécnica de La Almunia
**Degree:** 424 - Bachelor's Degree in Mechatronic Engineering
**ECTS:** 6.0
**Year:** 1
**Semester:** Second semester
**Subject Type:** Basic Education
**Module:**

# 1. General information

## 1.1. Aims of the course

The subject and its expected results respond to the following approaches and objectives:

Expose the universal nature of physical laws, their inexorable character and the enormous benefits that are obtained from their knowledge in the field of engineering.

The following SDGs will be worked on during the next academic year:

-Goal 7: Affordable and Clean Energy.

-Goal 8: Sustainable Cities and Communities.

## 1.2. Context and importance of this course in the degree

Basic Physics II is a basic training subject, with 6 ECTS credits that is taught during the first year of this Engineering Degree.

It aims to provide the student with the basic knowledge of the most relevant phenomena and physical laws of application in the study of engineering; as well as the necessary tools to apply this theoretical knowledge to the resolution of engineering problems. More specifically, it focuses on the study of electromagnetism and waves.

## 1.3. Recommendations to take this course

It is a basic subject that must provide a first contact with the foundations, methods and scientific procedures of Physics. A close relationship is established with other analogous subjects such as physics I, Mathematics I, II, III inserted within the degree itself.

In order to face the subject with guarantees, it is recommended to have completed physics and mathematics in the second year of high school or equivalent.

# 2. Learning goals

## 2.1. Competences

Upon passing the subject, the student will be more competent to:

- Generic competence:
  - **GI03:** Knowledge of basic and technological subjects, which enables them to learn new methods and theories, and give them the versatility to adapt to new situations.
  - **GI04:** Ability to solve problems with initiative, decision making, creativity, critical reasoning and to communicate and transmit knowledge, skills and abilities in the field of Mechatronic Engineering and in particular in the field of industrial electronics.
  - **GC02:** To interpret experimental data, contrasting it with the theoretical foundations to draw conclusions.
  - **GC03:** Capacity for abstraction and logical reasoning.
  - **GC04:** Ability to learn in a continuous, self-directed and autonomous way.

        - **GC05:** Ability to evaluate alternatives.
        - **GC07:** Ability to lead a team as well as being a committed member of it.
        - **GC08:** Ability to locate technical information, as well as its understanding and assessment.
        - **GC10:** Ability to write technical documentation and to present it with the help of appropriate computer tools.
        - **GC11:** Ability to communicate their reasoning and designs clearly to specialized and non-specialized audiences.
    - Specific competence:
        - **EB02:** Understanding and mastery of basic concepts about the general laws of wave and electromagnetism and its application in the resolution of engineering problems

### 2.2. Learning goals

The student, to pass this subject, must demonstrate the following results:

To be able to:

- Solve practical exercises of waves using the notions studied in the theoretical classes.
- Recognize the physical magnitudes that characterize a wave, and describe it.
- Understand and explain the physical meaning of the Electric Field.
- Solve exercises of simple electrical circuits.
- Recognize the effects that an insulating material has on a condenser or other device.
- Calculate potentials and electric fields created by continuous distributions of electric charge.
- Use the laws of Biot-Savart and Ampère to calculate magnetic fields created by electric currents.
- Describe the effect that magnetic fields have on electric charges and their technological applications.
- Explain the laws of electromagnetic induction, apply them to specific cases and relate them to the mechanisms of production of electrical energy.
- Calculate the self-induction of different devices, and in particular of coils.
- Understand the effects of coils in electric circuits in direct and alternating current.
- Solve practical optical exercises with the knowledge acquired in class.
- Identify and know the main magnitudes and concepts that are defined in the optics.

### 2.3. Importance of learning goals

Physical phenomena and their effects are among the most important fields of knowledge with major capacity to intervene in people life and society. The huge amount of physical applications developed since the end of the XIX century has changed substantially people life conditions, economical processes, knowledge management and scientific researches. The handling of the fundamental of such phenomena and the solutions that can be applied in order to use them has become an essential element in every technological process. The mastering of Physics could help every Engineer to comprehend the manufacture process, optimization of production systems, etc.

The contents of this subject are a vital part of the knowledges learnt in this degree, providind students concepts and tools necessaries to face with success other subjects, such as Electronics and Electricity.

## 3. Assessment (1st and 2nd call)

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

There is the possibility of passing the subject through two different routes:

1. Continuous evaluation.
2. Global Test.

**Continuous assessment:**

Following the spirit of Bologna, regarding the degree of involvement and continued work of the student throughout the course, the evaluation of the subject contemplates the continuous assessment system as the most appropriate to be in line with the guidelines set by the new framework of the EHEA.

- Partial exams: Two partial exams will be carried out within the class schedule. You have to get at least a 4 out of 10 in each one so that this part can be overcome. The exams are composed of a part of problems and another of theory (Total partial: 70%)
- Laboratory practices: 4 laboratory practices will be carried out. For each of them, the student must prepare a report about the activity carried out. Each of these reports will weigh 5% on the final grade. Assistance is mandatory. (Total practices: 20%)

- Participation in class: It will be valued: the attendance to class, the participation and involvement in the subject, the assistance to tutorials and the realization of exercises on the blackboard that the teacher will propose. (Total participation in class 10%) To qualify for the Continuous Assessment system, you must attend at least 80% of the face-to-face classes.

**Global Test:**

The student must opt ??for this modality when, due to his / her personal situation, he / she can not adapt to the rhythm of work required in the continuous evaluation system, he / she has suspended or would like to upload a grade, having participated in said evaluation methodology. As in the previous evaluation methodology, the final test of the final evaluation must have the purpose of checking if the learning results have been achieved, as well as contributing to the acquisition of the different competences, and should be carried out through more objective activities if fits.

- Final written test: On the date indicated by the University, a global examination of the subject will be carried out. It will have a weight of 70% of the final grade. The exam will consist of a part of problems and another of theory.
- Laboratory practices: 4 laboratory practices will be carried out. For each of them, the student must prepare a report about the activity carried out. Each of these reports will weigh 5% on the final grade. Assistance is mandatory. (Total practices: 20%).
- Participation in class: It will be valued: the attendance to class, the participation and involvement in the subject, the assistance to tutorials and the realization of exercises on the blackboard that the teacher will propose. (Total participation in class 10%).

# 4. Methodology, learning tasks, syllabus and resources

## 4.1. Methodological overview

The methodology followed in this course is oriented towards the achievement of the learning objectives. The course consists of 6 ECTS credits, which represents 150 hours of student work during the semester. 40% of this work (60 h.) will take place in the classroom, and the rest will be autonomous work. One semester consists of 15 teaching weeks. To make the timing is used to measure the school week, in which the student must devote to the study of the subject 10 hours.

If classroom teaching were not posssible due to health reasons, it would be carried out on-line.

## 4.2. Learning tasks

The course includes the following learning tasks:

- Lectures: theoretical activities so fundamentally expository given by the teacher.
- Practice Sessions: practical discussion activities and conducting exercises conducted in the classroom and requiring high student participation.
- Laboratory Practice: Practical activities in laboratories.
- Group tutorials.
- individual tutoring.

## 4.3. Syllabus

The course will address the following topics:

I. Electronics
II. Magnetism
III. Mechanical waves
IV. Optics

## 4.4. Course planning and calendar

Planning for weeks about the subject is as follows:

| Week | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Topic | I | I | I | I | II | II | II | II | III | III | III | IV | IV | IV | R |
| Exams | 1º | | | | | | | | 2º | | | | | 3º | |

The dates for the continuous assesment tasks will be available at the moodle platform.
The dates for the global assesment will be available at https://eupla.unizar.es/asuntos-academicos/examenes

### 4.5. Bibliography and recommended resources

http://psfunizar10.unizar.es/br13/egAsignaturas.php?codigo=28806