Universidad Zaragoza

Academic Year/course: 2022/23

28806 - Physics II

Syllabus Information

Academic Year: 2022/23
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

Once the subject is passed, the student will 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

The activities carried out in this subject are of high formative content since they encourage the development of the reasoning, analysis and synthesis skills, problem-solving and application cases and initiation to laboratory work and to the application of the scientific method.
Due to its condition as a basic training subject, the competence acquired corresponds to what is required in every degree in the fields of Engineering and Architecture.
Being a subject taught during the first course, on the one hand, it should serve to strengthen and homogenize the knowledge acquired in previous educational stages and, on the other hand, act as a foundation to build on it the most specific technical knowledge that will be addressed in other subjects of the degree. In particular, all those that are related to Electronics and Electricity.

3. Assessment (1st and 2nd call)

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

The student must demonstrate that they have achieved the expected learning outcomes through the following assessment activities.

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

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 considers the continuous evaluation system as the most consistent to be in line with the guidelines set by the new framework. from the EHEA.

To opt for the Continuous Assessment system, you must attend at least 80% of the face-to-face classes. It will consist of:

- **Written Tests**: two partial written tests will be carried out whose grade (NE) will be the average of all of them. To pass this part, it is required to obtain a grade greater than or equal to 4.0 in each partial exam. In addition, NE must be greater than or equal to 5.0. The weight of this mark in the final evaluation of the course will be 80%.
- **Laboratory practices:** Up to 4 laboratory practices will be carried out. They are compulsory face-to-face activities that the student must have carried out to pass the subject and a report on the activity carried out must be prepared.

To pass this part, the Practices grade (NP) must be greater than or equal to 5.0. The weight of this mark in the final evaluation of the subject will be 20%.

The final grade for the course will be: **NF = 0.80 NE + 0.20 NP**

To pass the course, the student must obtain an NF grade greater than or equal to 5.0.

Global Assessment:

The Global Assessment will consist of:

- **A Written exam:** there will be a final written exam whose grade must be greater than or equal to 5.0 to pass the

course. In the two global evaluation calls the same evaluation procedure will be followed.

Note: in case the students do not pass the subject through Continuous Assessment, they can do so through Global Assessment. In addition, in the event that the students have passed the subject through Continuous Assessment and want to improve their grade, they may carry on the global exam at 1st call of the Global Assessment without risk of lowering their grade.

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.

The approach, methodology and assessment of this guide are intended to be the same for any teaching scenarios. They will be adapted to the social-health situation at any particular time, as well as to the instructions given by the authorities concerned.

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