Universidad Zaragoza

Academic Year/course: 2022/23

39606 - Basic physics II

Syllabus Information

Academic Year: 2022/23
Subject: 39606 - Basic physics II
Faculty / School: 175 - Escuela Universitaria Politécnica de La Almunia
Degree: 608 -
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:

- Understand the fundamental concepts and laws of electromagnetism and mechanical waves, and application to basic problems in engineering.
- Analyze problems that integrate different aspects of physics, recognizing the various physical fundamentals that underlie a technical application, device or real system.
- Understand the units, orders of magnitude of the defined physical magnitudes and solve basic engineering problems, expressing the numerical result in the appropriate physical units.
- Correct use of basic methods for experimental measurement or simulation and treat, present and interpret the data obtained, relating them to the appropriate magnitudes and physical laws.
- Use bibliography, by any of the currently available methods and use clear and precise language in their explanations on physics issues.
- Correctly apply the fundamental equations of electromagnetism to various fields of physics and engineering. Understand the meaning, utility and relationships between magnitudes.
- Being able to understand and describe wave phenomena.
- Understand the physical meaning of the elements used in simple electrical circuits and become proficient in their analysis.
- Understand electromagnetic waves as a solution to Maxwell's equations.
- Use of different software tools to process physical data.

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:
    - **GC04:** Ability to solve problems and make decisions with initiative, creativity and critical reasoning.
    - **C11:** Ability to learn continuously and develop autonomous learning strategies.
- Specific competence:
- - **C13:** Understand and command of the basic concepts of the general laws of mechanics, fields and waves and electromagnetism and their application to solve engineering problems.

2.2. Learning goals

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

Be able to:

- Know the fundamental concepts and laws of mechanics, thermodynamics, fields, waves and electromagnetism and their application to basic problems in engineering.
- He analyzes problems that integrate different aspects of physics, recognizing the various physical foundations that underlie a technical application, device or real system.
- Know the units, orders of magnitude of the defined physical magnitudes and solve basic engineering problems, expressing the numerical result in the appropriate physical units.
- Correctly uses basic methods of experimental measurement or simulation and treats, presents and interprets the data obtained, relating them to the appropriate magnitudes and physical laws.
- Uses bibliography, by any of the currently available means and uses clear and precise language in his explanations on physics issues.
- Know the main properties of the electric and magnetic fields, the classical laws of electromagnetism that describe and relate them, their meaning and their experimental basis.
- Use Biot-Savart's and Ampère's laws to calculate magnetic fields created by electric currents.
- Knows and uses the concepts related to capacity, electric current and self-induction and mutual induction, as well as the basic electrical and magnetic properties of materials.
- Explain the laws of electromagnetic induction, apply them to specific cases and relate them to the mechanisms for producing electrical energy.
- Know the wave equation, the characteristic parameters of its basic solutions and their energetic aspects. Analyze the propagation of mechanical waves in fluids and solids and know the fundamentals of acoustics.
- Understand the effects of coils in electrical circuits in direct and alternating current.
- Recognizes the properties of electromagnetic waves, the basic phenomena of propagation and superposition, the electromagnetic spectrum, the basic aspects of light-matter interaction and the applications of the above phenomena in technology.

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)

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 contemplates the continuous assessment system as the most appropriate to be in line with the guidelines set by the new framework of 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=39606