Universidad del País Vasco — Euskal Herriko Unibertsitatea

COURSE GUIDE 2025/26

Faculty 345 - Faculty of Engineering - Bilbao **Cycle** .

Degree GITECI30 - Bachelor`s Degree in Industrial Technology Engineering **Year** First year

COURSE

27414 - Physics **Credits, ECTS:** 9

COURSE DESCRIPTION

"Physics", taught in the first year, introduces essential concepts of physics needed in engineering, with the prerequisite of secondary school Mathematics and Physics.

Physics is a fundamental subject within engineering studies, since it establishes the foundations for more specialized subjects that are addressed in subsequent years, such as Mechanics, Fluids, Applied Thermodynamics, Materials Science, or Electrical Engineering.

COMPETENCIES/LEARNING RESULTS FOR THE SUBJECT

COMPETENCIES
This subject covers the competency related to Physics included in the Basic Subjects Module:
-"Understanding and mastery of the basic concepts of the general laws of mechanics, thermodynamics, fields and waves and electromagnetism and its application for the resolution of engineering problem".
It deals with theoretical as well as experimental aspects of physics laws, stressing their implications in industrial technology environment.

LEARNING RESULTS
Students, faced to a certain physical situation are expected to:
- Identify the physical phenomenon (among different branches of Physics) and the magnitudes relevant to its analysis
- Decide which physical laws relate the magnitudes involved
- Use the mathematical tools necessary to work out the unknowns of the physical situation and make predictions.

Theoretical and Practical Contents

Chapter 1. INTRODUCTION
Chapter 2. VECTOR CALCULUS
Chapter 3. PARTICLE KINEMATICS
Chapter 4. NEWTON'S LAWS
Chapter 5. GENERAL DYNAMICS OF A PARTICLE
Chapter 6. OSCILLATORY MOTION
Chapter 7. DYNAMICS OF A SYSTEM OF PARTICLES
Chapter 8. RIGID BODY MOTION
Chapter 9. FLUIDS
Chapter 10. THERMODYNAMICS I. GENERAL CONCEPTS. THE FIRST LAW OF THERMODYNAMICS
Chapter 11. THERMODYNAMICS II. THE 2ND LAW OF THERMODYNAMICS

In addition, in the laboratory sessions some basic laws of electromagnetism and optics will be studied.

TEACHING METHODS

1. Lectures: Covering theoretical aspects and problem solving.

2. Seminars: Demonstration experiments are conducted for direct observation of physical phenomena.

3. Laboratory sessions: Students, in pairs, will conduct several experiments illustrating fundamental physical laws, following some laboratory instructions written by the Physics teaching staff. Each group must write a report on each experiment including experimental results and analysis. Reports are graded.

TYPES OF TEACHING

Types of teaching	M	S	GA	GL	GO	GCL	TA	TI	GCA
Hours of face-to-face teaching	30	6	30	24					
Horas de Actividad No Presencial del Alumno/a	45	9	45	36					

Legend:
M: Lecture-based — S: Seminar — GA: Applied classroom-based groups
GL: Applied laboratory-based groups — GO: Applied computer-based groups — GCL: Applied clinical-based groups
TA: Workshop — TI: Industrial workshop — GCA: Applied fieldwork groups

Evaluation methods

- Continuous evaluation
- End-of-course evaluation

Evaluation tools and percentages of final mark

- Written test, open questions 85%
- Teamwork assignments (problem solving, Project design) 15%

ORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

Continuous assessment consists of a short mid-term test, an exam and eight laboratory practices. The mid-term test is a brief exam carried out at lecture hours, the exam takes place after the end of the first term, and lab work is carried out along the first and second terms. The grade of lab work is the average of gradings in the lab reports. Attending all laboratory sessions is mandatory and students must perform satisfactorily in all the sessions in order to pass the course in continuous assessment.

Final grade is given by the following formula:

0.05*test + 0.15*lab + 0.8*January exam

Non-pass students will have the opportunity to take a new exam in the ordinary-call evaluation period (May). In this case, the final grade is given by the formula:

0.85*exam + 0.15*lab

Students that do not attend this exam will be considered voluntary waivers.

Students can renounce the continuous assessment by providing a written resignation to the professor before week no. 18. In that case, they will sit for a specific laboratory exam that will take place on the same date as the first-sit exam at a different time. Passing the laboratory exam is compulsory to pass the course.

EXTRAORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

The final grade is obtained from the grading of the resit exam and the continuous assessment grading of laboratory work. Students who did not pass the laboratory work in continuous assessment will sit for a specific laboratory exam that will take place on the same date as the written resit exam and at a different time. Passing the laboratory exam is necessary to pass the subject.

Final grade is calculated using the following formula:

0.85*exam and 0.15*laboratory work

Students who do not sit for the exam will be considered as voluntary waivers.

MANDATORY MATERIALS

The Department of Applied Physics publishes a book entitled "Physics" which includes this subject's theoretical contents and problem sets. This book can be purchased at the Editorial Service of the Engineering Faculty at cost price.

BIBLIOGRAPHY

Basic bibliography

Physics,Tipler and Mosca; Vols 1,2 6th Edition (2008) W.H. Freeman and Co.
Física, Tipler y Mosca; Vols 1 y 2, 5ª Edición (2005) o 6ª Edición (2010) Reverté
Física Universitaria, Young y Freedman (2018) Ed. Pearson
Física conceptual, P.G. Hewitt (2013) Pearson Mexico
Fisika zientzialari eta ingeniarientzat, P. Fishbane (2008) EHU Argitalpen zerbitzua

Detailed bibliography

Lectures on Physics, Volúmenes 1 y 2, Feynman, Leighton y Sands, Addison.-Wesley Iberoamericana, 1989
Zemansky, Mark Waldo ; Richard H. Dittman. Calor y termodinámica.: McGraw-Hill, DL 1990
Campos Electromagnéticos. R.K. Wangsness Ed. Limusa (Méjico) 2006

Journals

Revista Española de Física
European Journal of Physics
American Journal of Physics

Web sites of interest

http://www.sc.ehu.es/sbweb/fisica/default.htm

http://www.fearofphysics.com/index1.html
http://www.hiru.com/fisika

OBSERVATIONS

In any exam, only scientific calculators will be allowed (non-programmable) and students are not allowed to wear/use/have earphones or mobile phones.