

COURSE GUIDE

2025/26

Faculty

345 - Faculty of Engineering - Bilbao

Cycle

.

Degree

GITECI30 - Bachelor`s Degree in Industrial Technology Engineering

Year

First year

COURSE

27304 - Extended Physics

Credits, ECTS: 6

COURSE DESCRIPTION

ADVANCED PHYSICS is a natural continuation of PHYSICS subject. Being both of them a first year subject, they ground their bases in the contents of secondary school Mathematics and Physics. ADVANCED PHYSICS also establishes the foundations for more specialized subjects that will be addressed in subsequent years, such as Electrotechnics, Materials Science, Electrical Machines, Electronics, Electrical Engineering or Automatics. This makes Advanced Physics a fundamental subject for engineering studies.

COMPETENCIES/LEARNING RESULTS FOR THE SUBJECT

Understanding and command of advanced concepts of electromagnetism, basic concepts of optics and quantum physics, and their application to solve engineering problems.
Advanced Physics treats Electric Fields, Electric Currents, Magnetism, Electromagnetic Induction, Waves, Geometrical Optics and principles of Quantum Physics.
Students facing a certain physical situation are expected to identify the physical phenomenon (among different branches of Physics) together with the most relevant magnitudes, to decide which are the physical laws that relate the magnitudes involved in the problem and to use the mathematical tools needed to find the unknowns appearing to the physical situation.

Theoretical and Practical Contents

Chapter 1: Electrostatics
Chapter 2: Electric fields in the presence of matter
Chapter 3: Electric Currents
Chapter 4: Magnetism
Chapter 5: Electromagnetic Induction
Chapter 6: Waves
Chapter 7: Geometrical Optics
Chapter 8: Introduction to Quantum Physics

TEACHING METHODS

Lectures: covering theoretical aspects and problems solving. Some seminar-type experiments will be conducted, just in the classroom for direct observation of physical phenomena.

TYPES OF TEACHING

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

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

- End-of-course evaluation

Evaluation tools and percentages of final mark

- Written test, open questions 90%
- Short test (written and individual): 10%

ORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

Test: the students will perform a short test in the middle of the term, during one of the classes. The test grade contributes to the final grade with a 10%.
Official Regular Exam (the exam will be the same for all groups), which will consist of several questions, theoretical as well as problems. The resulting mark will contribute 90% to the final grade.
Students who do not sit for the exam will be considered as voluntary waivers.

EXTRAORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

Official Extraordinary Exam (the exam will be the same for all groups) will consist of several questions, theoretical as well as problems. The resulting mark will contribute 100% to the final grade. The result of the test will not be taken into account.
Students who do not sit for the exam will be considered as voluntary waivers.



MANDATORY MATERIALS

The Applied Physics Department publishes the book "Advanced Physics", including theoretical contents and problem sets. The book can be purchased at the Editorial Service of the Engineering Faculty at cost price.

BIBLIOGRAPHY

Basic bibliography

Fisika Zientzialari eta Ingeniarientzat; P. Fishbane, EHU Argitalpen zerbitzua, 2008
Física Universitaria, Young, Freedman, Ed. Pearson 2018
Física, Tipler y Mosca; Vols 1 y 2, 5ª Edición, Reverté 2005
Física, Alonso y Finn, Addison-Wesley Iberoamericana, 1995
Física conceptual, P.G. Hewitt, Prentice Hall Mexico, 2004

Detailed bibliography

Campos Electromagnéticos. R.K. Wangsness Ed. Limusa (Méjico) 2006
E. Hecht, A. Zajac. Óptica. Ed. Addison Wesley, 2000.
Física Cuántica Eisberg, R. Y Resnick, R.: Ed. LIMUSA. 2005
Lectures on Physics, Feynman, 2 eta 3 bolumenak, Leighton eta Sands, Addison.-Wesley Iberoamericana, 1989

Journals

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

Web sites of interest

EHU-ko Fisika Sailak garatutako materiala:
<http://www.sc.ehu.es/sbweb/fisika/default.htm>
Beste helbide interesgarriak:
<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 use mobile phones.