UAB
Universitat Autònoma de Barcelona

Physics II

Code: 105036
ECTS Credits: 6

2024/2025

Degree	Type	Year
2502444 Chemistry	FB	1

Contact

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Teaching groups languages

You can view this information at the end of this document.

Prerequisites

There are no official pre-requisites. However, it is assumed that students have aquired the basic knowlegde in Physics and Mathematics taught during the last years of High School. For those students who have not followed Physics during the last years of High School it is highly recommendeded to enroll the propedeutic course of Physics taught by the Physics Department during the first two weeks of September. There is also the possibility of enrolling the propedeutic course of Mathematics, also taught by the Physics Department.

Objectives and Contextualisation

The aim of this course is that students know the basic principles of Nature, from the smallest (atomic nucleus and elementary particles) to the largest (planets and stars), and also that students will be able to apply them and describe physical phenomena in a quantitative and qualitative way. Students will learn the necessary tools to understand the material's structure, concepts, principles and research exploration in Chemistry. Also, students will aquire the critical thinking and the ability to acquire new knowledge in an autonomous way.

Competences

- Adapt to new situations.
- Apply knowledge of chemistry to problem solving of a quantitative or qualitative nature in familiar and professional fields.
- Communicate orally and in writing in one's own language.
- Have numerical calculation skills.
- Learn autonomously.
- Manage, analyse and synthesise information.
- Obtain information, including by digital means.
- Propose creative ideas and solutions.
- Reason in a critical manner
- Resolve problems and make decisions.
- Show an understanding of the basic concepts, principles, theories and facts of the different areas of chemistry.
- Work in a team and show concern for interpersonal relations at work.

Learning Outcomes

1. Adapt to new situations.
2. Apply knowledge of physics to solve chemistry problems.
3. Communicate orally and in writing in one's own language.
4. Describe the concepts, principles and theories of physics to understand and interpret the structure of matter and the nature of chemical processes.
5. Have numerical calculation skills.
6. Learn autonomously.
7. Manage, analyse and synthesise information.
8. Obtain information, including by digital means.
9. Propose creative ideas and solutions.
10. Reason in a critical manner
11. Resolve problems and make decisions.
12. Work in a team and show concern for interpersonal relations at work.

Content

Waves (I). Waves in motion

1. Introduction
2. Wave pulses
3. Harmonic waves
4. Velocity of propagation
5. Energy of a wave
6. Doppler effect

Waves (II). Interferences

1. Interfetence of waves
2. Standing waves
3. Thin-film interference
4. Bragg difraction
5. Young experiment
6. Difraction grating
7. Difraction

Electrostatic field. Capacitors

1. Electric charge and electromagnetic interaction
2. Electric fields
3. Energy and electrostatic potential
4. Electric dipoles
5. Gauss's law for the electric field and applications
6. Dielectric and conductive materials. Electrostatic equilibrium
7. Capacitors

Electric current

1. Current intensity
2. Ohm's law. Electric resistance
3. Batteries. Electromotive force
4. Resistance combinations
5. Direct Current Circuits
6. Charge and discharge of a capacitor

Magnetic field

1. Magnetic field. Properties
2. Movement of a point charge in a magnetic field
3. Lorentz force. Applications
4. Magnetic forces on currents. magnetic dipole
5. Magnetic field sources
6. Forces between currents.
7. Ampère's Law and applications
8. Magnetic properties of matter

Magnetic induction

1. Magnetic induction. Faraday-Lenz law
2. Self-induction and mutual induction between circuits
3. Magnetic energy accumulated in inductors. Inductor charge and discharge
4. LC oscillating circuits
5. AC generator
6. Electrical energy transmission. Transformers

Electromagnetism

1. Ampere-Maxwell Law
2. Maxwell's laws in vacuum
3. Electromagnetic radiation. Wave nature of light
4. Properties of light (reflection, refraction and polarization)
5. Electromagnetic spectrum

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Practical cases lectures	13	0.52	2, 3, 4, 7, 8, 9, 10, 11, 5
Theory lectures	36	1.44	2, 6, 3, 4, 7, 10
Type: Autonomous			
Individual study and exercises	50	2	2, 6, 3, 4, 7, 8, 9, 10, 11, 5
Team work	26	1.04	2, 3, 4, 7, 8, 9, 10, 11, 5, 12

The course consists of two types of guided activities, theory classes and problem classes, which are distributed throughout the course in an approximate ratio of 3 to 1.

Theory lectures

Professors will lecture on the contents of the course mainly in the blackboard and with support from multimedia material, which will be available for students in the Campus Virtual. In order to profit theory lectures to the maximum, students should prepare the sessions in advance making use of such material and the bibliography. Moreover, students will be encouraged to explore deeper aspects of the topics being studied by means of additional material (websites, videos, applets, etc) to be found also in the Campus Virtual. Professors will in

some cases support the theory with some practical examples. Student participation in the lectures is highly encouraged.

Practice lectures

Professors will resolve practical exercises from the list that will be provided via the Campus Virtual. Students should work on the exercises prior to the practice session, in order to ensure participation and discussion on doubts or alternative solutions that students may have found.

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Assessment

Continous Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Continuous assessment activities	20%	16	0.64	1, 2, 6, 3, 4, 7, 8, 9, 10, 11, 5, 12
Partial exams	80%	9	0.36	1, 2, 3, 4, 7, 9, 10, 11, 5

Continuous assessment

The teaching and evaluation of this course will be based on the concept of continuous assessment. The emphasis is therefore placed on the continuous work by students, as well as on providing them with tools that allow the assessment of their level of acquisition of the skills and contents of the course. For this purpose, activities such as questionnaires on theoretical concepts, class activities, delivery of advanced problems, etc. will be carried out. These activities will also serve as evidence of the work done and for the student's grade.

The content of the subject will be taught in two blocks separated by the first evaluation period by Easter. Passing the course requires passing both blocks separately. For this, a sufficient degree of achievement and progress must be demonstrated by the student in each block.

Qualification

In each block there will be a partial exam that together with the continuous evaluation activities will determine your grade. The grade of each block will be calculated as follows: 80% exam grade + 20% continuous assessment activities.

- The student's continued work activities will be evaluated according to their degree of compliance and quality. Failure to complete all the activities or to deliver them in general with a very poor result will imply a zero in this category.
- To pass a block, the exam grade must be equal to or greater than 4.

The final grade for the course is obtained as the average of the grades from both blocks passed separately. Average will not be applied having failed one of the blocks.

Supplementary exam:

In the event that the student does not pass one or both blocks, they will have the option of taking a supplementary exam covering the content of the failed block or blocks. As the exam replaces the complete partial grade, it is mandatory to pass this exam (grade equal to or greater than 5) to consider the subject passed. In order to participate in this second chance exam, the student must have participated in continuous assessment activities that equal two thirds of the total grade.

Improving grades:

Students may take the supplementary exam also in order to improve the course grade. The grade that the students have already achieved on the content on which they want to be reexamined will be in any case kept.

Not assessable

The subject will be marked as "Not assessable" when the student has not participated in any of the evaluation activities of one of the blocks of the subject (exams and continuous work activities).

On exams:

- Each exam will consist of a) a questionnaire about the theoretical concepts of the subject, and b) a set of exercises that the student must solve.
- To attend any of the exams it is mandatory to carry an identification document (ID or university card).
- Using unauthorized methods during one of the exams of the subject (copying or communicating with a classmate, use of mobile phones, use of smart watches, etc.) will be penalized with a final failure grade in the subject for the current academic year.

Single assessment:

Students who have opted for the single assessment modality will have to take a final test which will consist of an examination of the entire subject syllabus, with a similar structure to that described above for the partial tests in continuous assessment, to be done on the day in which the students in the continuous assessment take the second partial exam. The student's grade will be the grade of this test. If the final grade does not reach 5, the student has another opportunity to pass the subject through the supplementary exam. The same precedure as in continuous evaluation mode will be applied. The final evaluation will be reviewed according to the same procedure as in continuous evaluation mode.

Bibliography

Main book on theory and exercises:

P. A. Tipler y G. Mosca. "Física para la ciencia y la tecnología". Reverté. Barcelona. (2010, 6ª ed.)

Additional books:

D. E. Roller, R. Blum. Mecánica, Ondas y Termodinámica (vol. 1).Reverté. Barcelona (1986)
F. W. Sears, M.W. Zemansky, H.D. Young. Física universitaria. Addison-Wesley (1986)
S. Burbano de Ercilla, E. Burbano García, G. Diaz de Villegas Blasco. Física general: problemas. Tébar 27ª ed. (1991).
F. A. González. La física en problemas. Madrid, Tebar-Flores (1997)
J. Aguilar Peris, J. Casanova Col. Problemas de Física General. 4ª ed. Madrid, editorial Alhambra (1981)
D. Jou, J.E. Llebot, C. Pérez-García. Física para las ciencias de la vida. McGraw-Hill (2009, 2ª ed.)

Additional content:

Abundant additional texts will be provided to the student via the subject's area in the Virtual Campus.

Software

No particular software is needed to take the Physics II course, except for the usual tools to browse the internet. It is recommended to employ a program to generate pdf documents, which will be used to submit individual or group assignments via the CV.

Language list

Name	Group	Language	Semester	Turn
(PAUL) Classroom practices	1	Spanish	second semester	morning-mixed
(PAUL) Classroom practices	2	Catalan/Spanish	second semester	morning-mixed
(PAUL) Classroom practices	3	Catalan/Spanish	second semester	afternoon
(PAUL) Classroom practices	4	Catalan/Spanish	second semester	afternoon
(TE) Theory	1	Spanish	second semester	morning-mixed
(TE) Theory	2	Catalan/Spanish	second semester	afternoon