Universitat Autònoma de Barcelona

2019/2020

Physics II

Code: 105036
ECTS Credits: 6

Degree	Type	Year	Semester
2502444 Chemistry	FB	1	2

Contact

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Use of Languages

Principal working language: spanish (spa)
Some groups entirely in English: No
Some groups entirely in Catalan: No
Some groups entirely in Spanish: Yes

Teachers

Jorge Carretero Palacios

Prerequisites

There are no official pre-requisites. However, it is assumed that students have aquired the basic knowlegde in Physics and Mathematics taught during last years of High School (in particular, trigonometry and vector decomposition). For those students who have not followed Physics during last years High School it is highly recommendeded to enroll the propedeutic course of Physics gave by the Physics department during the first two weeks of September. There is also the possibility of enrolling the propedeutic course of Mathematics also gave 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 to aquire 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 ones 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 ones 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 field
2. Gauss theorem. Applications
3. Electric dipole
4. 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. Motion of a charged particles in a magnetic field
2. Magnetic force on a current-carrying conductor
3. Magnetic field sources
4. Ampère's circuital law
5. Magnetic induction. Faraday-Lenz law
6. Magnetism in matter

Alternating current circuits

1. Simple circuits
2. Current intensity in series AC circuits. Electrical impedance
3. Series RLC circuit as an oscillator. Resonance.

Electromagnetism

1. Maxwell's equations
2. Electromagnetic radiation
3. Polarization

Geometric Optics

1. Nature of Light
2. Reflexion and refraction

Methodology

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 addition, 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.

Activities

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

Assessment

There will be two independent tests (partial exams). These tests correspond to 80% of the final grades. In addition, there will be complementary activities (continuous assessment tests, homework, class activities, etc.). These ones correspond to 20% of the final grades.

Second-chance examination:

In case of the final mark being lower than 5, the student will have the opportunity to make a second-chance examination to increase its mark. In order to attend this second-chance examination the student must have participated in evaluation activities accounting for at least 2/3 of the final grades.

Not assessable

Students who have not attended to the second partial exam nor second-chance examination will be considered as not assesable.

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Additional evaluation 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

Bibliography

Theory:

P. A. Tipler y G. Mosca. Física. Reverté. Barcelona. (2010, 6ª ed.)
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)

Exercises:

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 Material:

To be found in the subject's Campus Virtual.