COURSE DATA

DATA SUBJECT

Code: 34190
Name: Physics II
Cycle: Undergraduate Studies
ECTS Credits: 6
Academic year: 2026-27

STUDY (S)

Degree	Center	Acad. year	Period
1110 - Degree in Chemistry	Facultat de Química	1	Second quarter
1934 - Double Degree Program in Chemistry-Chemical Engineering	Facultat de Química	1	Second quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
1110 - Degree in Chemistry	Physics	BASIC
1934 - Double Degree Program in Chemistry-Chemical Engineering	Primer curso	COMPULSORY

COORDINATION

FIORINI LUCA

SUMMARY

Physics II is a basic training course taught in the second semester of the first academic year. It is worth 6 credits, 4.5 of which are theoretical-practical credits and the remaining 1.5 correspond to laboratory practice. This course is the natural continuation of Physics I, taught in the first semester, and both together make up the Physics subject area of the degree.
The theoretical contents of Physics II, according to the document "Plan de estudios del Grado en Química", are: electric field, electric potential energy, electric circuits, magnetic field, motion of charges in magnetic fields, magnetic induction and electromagnetic radiation. The rest of the contents included in this document are covered in Physics I (mechanics, fluids, waves and optics).
The subject is complemented with laboratory sessions that include experiments in mechanics and electromagnetism, with the aim of helping students understand the concepts explained in the Physics II course and learn the basic measurement techniques used in Physics.

PREVIOUS KNOWLEDGE

RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

There are no specified enrollment restrictions with other subjects of the curriculum.

OTHER REQUIREMENTS

To take this course it is advisable that students have previously studied Physics and Chemistry in secondary education and Mathematics II and Physics in upper secondary education. It is also important that they have successfully completed the subjects Mathematics I and Physics I studied in the first semester.

COMPETENCES / LEARNING OUTCOMES

1108 -

Acquire a permanent sensitivity to quality, the environment, sustainable development and the prevention of occupational hazards.

Demonstrate ability to communicate information, ideas, problems and solutions to both specialist and non-specialist audiences and using information technology, as appropriate.

Demonstrate ability to work in teams both in interdisciplinary teams and in an international context.

Demonstrate a commitment to ethics, equality values and social responsibility as a citizen and as a professional.

Demonstrate knowledge and understanding of essential facts, concepts, principles and theories related to the areas of chemistry.

Demonstrate leadership and management skills, entrepreneurship, initiative, creativity, organization, planning, control, leadership, decision making and negotiation.

Demonstrate the ability to adapt to new situations.

Develop capacity for analysis, synthesis and critical thinking.

Develop sustainable and environmentally friendly methods.

Express oneself correctly, both orally and in writing, in any of the official languages of the Valencian Community.

Have basic skills in the use of information and communication technology and properly manage the information obtained.

Interpret data from observations and measurements in the laboratory in terms of their significance and the theories that underpin them.

Learn autonomously.

Recognise and analyse new problems and plan strategies to solve them.

Relate chemistry with other disciplines.

Relate theory and experimentation.

Show inductive and deductive reasoning ability.

Solve problems effectively.

Solve qualitative and quantitative problems following previously developed models.

Students must be able to apply their knowledge to their work or vocation in a professional manner and have acquired the competences required for the preparation and defence of arguments and for problem solving in their field of study.

Students must be able to communicate information, ideas, problems and solutions to both expert and lay audiences.

Students must have acquired knowledge and understanding in a specific field of study, on the basis of general secondary education and at a level that includes mainly knowledge drawn from advanced textbooks, but also some cutting-edge knowledge in their field of study.

Students must have developed the learning skills needed to undertake further study with a high degree of autonomy.

Students must have the ability to gather and interpret relevant data (usually in their field of study) to make judgements that take relevant social, scientific or ethical issues into consideration.

1110 - Degree in Chemistry

At the end of the course, the student will be able to address new problems and develop strategies to solve them.

At the end of the course, the student will be able to implement sustainable and environmentally friendly methodologies.

At the end of the course, the student will be able to relate theory and experimentation.

At the end of the course, the student will be able to solve problems effectively.

At the end of the course, the student will demonstrate inductive and deductive reasoning skills.

At the end of the course, the student will demonstrate the ability to analyse, synthesise and apply critical reasoning.

At the end of the course, the student will relate chemistry to other disciplines.

Collaborate effectively in teams, assuming responsibilities and leadership roles and contributing to collective improvement and development.

Communicate effectively, both orally and in writing, adapting to the characteristics of the situation and the audience.

Contribute to the design, development and implementation of solutions that address social needs, taking the Sustainable Development Goals as a reference.

Demonstrate critical and self-critical reasoning within the field of study, considering aspects such as professional ethics, moral values and the social implications of the different activities undertaken.

Express oneself correctly, both orally and in writing, in any of the official languages of the Valencian Community.

Propose creative and innovative solutions to complex situations or problems within the field of study, in order to respond to diverse professional and social needs.

Understand and recognise, from within the discipline, inequalities based on sex and gender in society; integrate different needs and preferences related to sex and gender into problem-solving and solution design.

DESCRIPTION OF CONTENTS

1. Electric field.
Electric interaction: electric charge. Force between charges: Coulomb's law. Electric field. Field lines. Electric field flux: Gauss's theorem.
2. Electric potential.
Electrostatic potential. Equipotential surfaces. Conductors. Capacitance. Capacitors. Electrostatic energy. Electric dipole. Dielectrics.
3. Electric current.
Electric current and resistance. Ohm's law. Combinations of resistors. Energy in electrical circuits: power. Kirchhoff's rules. Power balance. RC circuits: charging and discharging of a capacitor.
4. Magnetic field.
Introduction to magnetic phenomena. Force exerted by a magnetic field. Motion of charges in a magnetic field: examples. Action of a magnetic field on a loop.
5. Sources of the magnetic field.
Sources of the magnetic field: Biot-Savart law, examples. Force between wires: definition of the ampere. Ampère's theorem. Magnetic flux: Gauss's law in magnetism. Magnetism in matter: dia-, para- and ferromagnetism.
6. Magnetic induction and electromagnetic waves.
Magnetic induction. Faraday-Lenz law: examples. Inductance. Magnetic energy. Generators and transformers. Induced fields and electromagnetic waves.
7. Error theory I.
Measurement and uncertainties. Random and systematic errors. Absolute and relative errors. Significant figures. Uncertainties in direct measurements. Statistical analysis of uncertainties. Error propagation. Construction of graphs. Linear fitting.
8. Lab 1: Elastic properties of a spring.
Determination of the elastic constant of a spring by applying Hooke's law. Determination of the elastic constant from harmonic oscillations. Comparison of results.
9. Lab 2: Electrical measurements and Ohm's law.
Handling of multimeters. Interpretation and assembly of basic electrical circuits. Study of Ohm's law.
10. Lab 3: Measurement of magnetic induction and the transformer.
Measurement of the electromotive force induced in a coil. Measurement of the magnetic field at the centre of a coil. Study of the transformer.

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Tutorials	7,00
Theory	41,00
Laboratory	12,00
Total hours	**60,00**

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	5,00
Individual or group project	15,00
Independent study and work	20,00
Preparation of lessons	20,00
Preparation for assessment activities	20,00
Resolution of case studies	10,00
Total hours	**90,00**

TEACHING METHODOLOGY

The subject will consist of four types of classes with differentiated methodologies:
a) Theoretical classes, in which the basic theoretical contents of the subject will be taught. In combination with discussions and deductions on the blackboard, graphic tools may be used, including images, videos and animations, to illustrate some of the phenomena explained, as well as experimental demonstrations from the Classroom Demonstrations Collection of the Faculty of Physics, an initiative linked to several educational innovation projects of the Permanent Training and Educational Innovation Service.
b) Theoretical-practical classes, where practical examples illustrating the theoretical contents will be worked on. In these classes, a bulletin with problems and exercises will be made available to students, which will be scheduled to be solved by them before each of these classes. Students must explain the problems, adequately justifying the calculations carried out. In addition, some specific or monographic aspects of the subject may be indicated for study and discussion in these sessions. In fact, students will be encouraged and guided in expanding these contents through the recommended bibliography, as well as in the possibility of expanding their knowledge in future subjects.
c) Tutored work sessions. In these small-group classes, students will have the opportunity to raise any doubts that have arisen or discuss aspects of the subject previously worked on that present conceptual difficulties. The exercises and problems from the bulletin that have not been solved in the theoretical-practical classes will be addressed. The teaching staff will monitor the work and progress of students, in addition to resolving the doubts raised and facilitating the understanding of the fundamentals of the subject.
d) Laboratory sessions. Four sessions of 3 hours each will be conducted. The first session will be dedicated to explaining the theoretical contents related to the laboratory. These sessions will be carried out in small groups. Students will work in pairs when performing the practicals. Attendance at these sessions is mandatory and a necessary condition for passing the module.
Students must attend the laboratory having carefully read the instructions for the experiment to be carried out in each session (previously known). At the beginning of the session, the teaching staff will supervise the understanding of the instructions and guide students on the conceptual and technical aspects necessary to correctly begin data acquisition.
Students will use a laboratory notebook in which the data collected in the laboratory must be recorded. This notebook will also include preliminary estimates of the different magnitudes, graphs and any relevant comments regarding the execution of the experiment. The notebook will be supervised by the teaching

staff at the end of the session.
Students will be supervised throughout the practical sessions by the teaching staff, who will correct any possible errors and inappropriate work habits, if necessary.

EVALUATION

The evaluation of the subject will be based on the following sections:
A) Final exam. It will consist of several questions or exercises related to conceptual aspects of theory (50%), as well as problems (50%). The exam is a recoverable activity in the second examination session.
B) Continuous assessment. It is based on the monitoring, throughout the course, of the work developed by students, related both to the acquisition of the conceptual aspects of the subject and to calculation and problem-solving skills. The evaluation will be carried out through tests, online questionnaires and/or assignments to be submitted. Continuous assessment is a follow-up activity of student learning and cannot be recovered in the second examination session.
C) Evaluation of laboratory practices. A test will be carried out on the theoretical contents of the laboratory (scientific writing of results, calculation of uncertainties, data fitting, etc.). The laboratory notebook will be checked, although not graded, at the end of each laboratory session. Each pair of students must present a report detailing: introduction, materials and methods, data analysis (including data tables, graphical representations, fits and error calculations), results, conclusions and bibliography.
The grade for the laboratory practices is distributed as follows: theoretical content test 30%, laboratory reports 70%.
Attendance at laboratory sessions is mandatory. Non-attendance automatically implies failure to pass the laboratory module, which cannot be recovered in the second examination session. Failure of the laboratory module implies failure of the subject.
The **final grade** for the subject will be obtained from the weighted average of the grades from sections A (45%), B (30%) and C (25%), provided that both section A and section C obtain a minimum grade of 5 points out of 10.
The grade required to pass the subject is 5 points out of 10.
Final warning
Copying or plagiarism of any assignment that forms part of the assessment will result in the impossibility of passing the subject, and the student will be subject to the appropriate disciplinary procedures.
Please note that, according to Article 13 d) of the University Student Statute (RD 1791/2010, of 30 December), *"it is the duty of a student to refrain from using or cooperating in fraudulent procedures in assessment tests, in the work carried out or in official University documents"*.

REFERENCES

Basic:
• TIPLER P.A., MOSCA G., *Física para la ciencia y la tecnología*, Vol. 2. 5th edition, Barcelona, Reverté, 2010. 1412 p. ISBN 9788429144116.
• TIPLER P.A., MOSCA G., *Física per a la ciència i la tecnologia*, Vol. 2. 6th edition, Barcelona, Reverté, 2011. 1412 p. ISBN 9788429100000.
• TAYLOR J. R., *An Introduction to Error Analysis*, 2nd edition, Sausalito, University Science Books, 1997. 448 p. ISBN 093570275X.
• HALLIDAY D., RESNIK R., WALTER J., *Fundamentos de Física*, vol. 2, CECSA, 3rd edition, 2001. 528 p. ISBN 9789702401759.
• *Guía del Laboratorio para el primer ciclo del Grado en Física*. Universidad de Valencia, Valencia, 2010. Available at: http://www.uv.es/piefisic/w3pie/castellano/serv/laboratorios/index.htm
Additional:
• ALONSO M., FINN E.J., *Física*, Pearson Educación, 2000. 451 p. ISBN 9789684442238.