COURSE DATA

DATA SUBJECT

Code: 34189
Name: Physics I
Cycle: Undergraduate Studies
ECTS Credits: 6
Academic year: 2025-26

STUDY (S)

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

COLL COMPANY CESAR

SUMMARY

Physics I is a basic training subject taught in year 1, semester 1, worth 6 ECTS credits. It includes a theory component and a problem-solving practical component, both taught in the classroom. Physics II, taught in the second semester, together with this subject make up the Physics subject area for the Degree in Chemistry. The fundamentals introduced here will be looked at in further detail in the different subjects on physical chemistry taught in the degree. Physics I uses elementary mathematical tools of algebra, geometry, differential and integral calculus, taught in the year-1 subjects Mathematics I and II.

The descriptors proposed in the explanatory report for the Degree in Chemistry establish the following elements:

Magnitudes, units and dimensional analysis. Kinematics and dynamics of particles. Particles systems. Conservation theorems. Rotation dynamics. Gravitation. Fluids: hydrostatics and dynamics of fluids. Oscillatory movement: simple harmonic movement. Oscillatory movement: general characteristics.

Regarding the Sustainable Development Goals (SDGs), it is expected that students will be able to acquire a

particular sensitivity to sustainable water management (SDG 6), raw materials and energy sources (SDG 7) as well as sustainable and environmentally compatible development (SDGs 11, 12, 13, 14 and 15). To design, select and/or develop efficient chemical products and processes (SDG 7) that minimize their impact on the environment (SDGs 14 and 15), use alternative raw materials and generate less waste (SDG 11).

PREVIOUS KNOWLEDGE

RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

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

OTHER REQUIREMENTS

There are no specified enrolment restrictions with other subjects of the curriculum

It is advisable that students have studied mathematics and physics in upper secondary education. It is also important that they consolidate and extend their knowledge on mathematical principles in the subject Mathematics I, taught simultaneously in the first semester.
The most important prior knowledge is: Elementary vectorial algebra. Concept of derivative and integral, with application to elementary functions. Element

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

Act autonomously in learning, making well-founded decisions in various contexts, forming judgements based on experimentation and analysis, and applying knowledge to new situations.

Address new problems and propose strategies to solve them.

Collaborate effectively in work teams, assume responsibilities and leadership roles, and contribute to collective improvement and development.

Communicate effectively both orally and in writing, adapting to the context and audience.

Contribute to the design, development and implementation of solutions that respond to social demands, using the Sustainable Development Goals as a reference.

Demonstrate both inductive and deductive reasoning skills.

Demonstrate critical and self-critical thinking, considering professional ethics, moral values and social implications of the different activities carried out throughout the degree.

Demonstrate the ability to analyse, synthesise and reason critically.

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

Implement sustainable and environmentally friendly methodologies.

Propose creative and innovative solutions to complex situations or problems in the field, addressing diverse professional and social needs.

Relate chemistry to other disciplines.

Relate theory to experimentation.

Solve problems effectively.

Understand and analyse, from the perspective of the degree programme, social inequalities based on sex and gender; integrate gender-sensitive approaches into problem-solving and solution design.

DESCRIPTION OF CONTENTS

1. Introduction

Presentation of the course. Magnitudes and units. Dimensional analysis.

2. Vectors

Concept of vector. Sum of vectors and product by a scalar. Cartesian components. Scalar and vector product.

3. Summary of Kinematics

Reference system. Velocity. Acceleration. Intrinsic components. Rectilinear motion. Circular motion. Parabolic motion.

4. Dynamics of the particle.

Newton's laws. Momentum and force. Angular momentum and moment of a force. Work, power, and energy. Conservation of mechanical energy. Relative motion, inertial and non-inertial reference system.

5. Particle systems

Center of mass. Theorems of conservation of the linear moment, angular moment and energy. Collisions. System of reference of the CM. Theorems of König.

6. Solid Rigid Rotation

Kinetic energy of rotation. Moment of inertia. Fundamental Equation of the dynamics of rotation. Translation and rotation. Rolling.

7. Gravitation

Law of universal gravitation. Kepler's laws. Gravitational potential energy. Earth's gravitational field.

8. Fluids

Hydrostatic pressure and Pascals principle. Theorem of Archimedes. Fluid dynamics. Ideal fluid; Bernoulli equation. Real fluid; viscosity; Poiseuille equation.

9. Oscillatory movement

Hookes law. Simple harmonic motion. Elastic potential energy.

10. Ondulatory Movement

General characteristics. Types of waves. Monodimensional wave equation. Harmonic waves. Spherical waves. Power and intensity. Sound waves. Doppler effect.

11. Properties of the waves

Principle of superposition. Standing waves. Huygenss principle. Reflection and refraction. Wave nature of light. Youngs double slit experiment. Fraunhofer diffraction.

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Tutorials	9,00
Theory	51,00
Total hours	**60,00**

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	0,00
Individual or group project	0,00
Independent study and work	45,00
Preparation of lessons	30,00
Preparation for assessment activities	15,00
Resolution of case studies	0,00
Total hours	**90,00**

TEACHING METHODOLOGY

The course will be developed through the following teaching methods:

• Lectures

• Participatory classes

• Problem solving

• Reading/analysis of texts

• Search of information

• Problem-based learning

In the theory-practical classes the basic theoretical content of the subject will be taught, as well as the practical examples of problems and exercises that better illustrate the topics. In combination with discussions and deductions on the board, the lecturer may use graphical tools that include images, videos and animations to illustrate some of the phenomena explained, as well as experimental demonstrations. Although most of the elements in the study programme will be addressed directly in these lessons, some specific or monographic items in the syllabus may be listed for independent study. In fact, students will be encouraged and guided to increase knowledge on these contents through the recommended reading list.

In problem-based classes, arranged into small groups (group tutoring), a booklet with problems and

exercises will be made available and programmed to be solved by students in advance of the classes. There, students will need to explain the problems by properly justifying their calculations and may raise questions and ask for clarification of any aspect or difficulty with concepts or calculations. The lecturer will monitor the students' work and progress and may request the problems' solutions in writing for assessment. The lecturer will solve any questions raised by students. During the development of the sessions, students may also be assigned basic exercises that facilitate an understanding of the subject-specific fundamentals.

EVALUATION

Assessment of the subject, both for the first and second examination sittings, will be based on the following sections:

A) Final exam: it will consist of several questions or exercises related to theory concepts (60%) and to problems (40 %). The exam will have a maximum duration of 3 hours and will be the same for all groups of the subject.

B) Continuous assessment: based on the coursework carried out by students in exercises and problems presented and/or submitted or follow-up tests.

The final mark is calculated from the highest of these two:

1) Weighted average of the marks earned in (A) (75%) and B (25%), provided that the mark for A is equal to or greater than 4 points out of 10.

2) Mark for A (out of 10)

The minimum overall mark to pass the subject is 5 points out of 10.

Final warning

Copying or plagiarism of any assignment that is part of the evaluation will make it impossible to pass the course, 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, December 30), "*it is the duty of a student to refrain from using or cooperating in fraudulent procedures in evaluation tests, in the work performed or in official University documents*".

REFERENCES

- TIPLER, P. A.; MOSCA G. Física para la Ciencia y la Tecnología, Vol. 1. 5a Edición. Barcelona: Reverté, 2005. 604 p. ISBN: 84-291-4411.

- HALLIDAY, D.; RESNICK, R.; WALKER J. Fundamentals of Physics. 4a Edición. New York: John Wiley and Sons, 1993. 1130 p. ISBN 0-471-52461-1.

- OHANIAN, H. C. Physics. 2a Edición. New York: Norton, 1989. 1148 p. ISBN 0-393-95750-0.

- ALONSO M., FINN E.J. Física. México: Addison-Wesley Iberoamericana, 1995. ISBN: 978-0-201-62565-3

- REX, A. F.; WOLFSON, R. Fundamentos de Física. 1a Edición. Madrid: Pearson Educación, S. A., 2011. ISBN: 9788478291250.