COURSE DATA

DATA SUBJECT

Code: 34108
Name: Physics
Cycle: Undergraduate Studies
ECTS Credits: 6
Academic year: 2025-26

STUDY (S)

Degree	Center	Acad. year	Period
1201 - Degree in Pharmacy	Facultat de Farmàcia i Ciències de L'alimentació	1	First quarter
1211 - Double Degree in Pharmacy and Human Nutrition and Dietetics	Facultat de Farmàcia i Ciències de L'alimentació	1	First quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
1201 - Degree in Pharmacy	Physics	BASIC
1211 - Double Degree in Pharmacy and Human Nutrition and Dietetics	Asignaturas obligatorias del PDG Farmacia-Nutrición Humana y Dietética	COMPULSORY

COORDINATION

JIMENEZ MUÑOZ JUAN CARLOS

SUMMARY

Physics is a first-year 6-credits quarterly Basic Training subject (Obligatory subject in the case of the DD) taught in the first quarter of the academic year.

The objective of this subject is to provide main physical concepts and to describe physical phenomena of interest in industry and in pharmaceutical research.

The subject may be considered as divided up in four basic blocks to study: measurements, errors and uncertainties, and unit systems, ideal and real fluid mechanics, thermodynamics, wave phenomena, and ionizing radiation.

There is a part of theory and problems that is taught in the classroom for the full group and another part composed of laboratory practicals that is taught in the laboratory in 16-students subgroups. It also helps to complete the student's training with 2 seminars and 2 tutorials in small groups.

The School of Pharmacy and Food Science is a pilot center of the Universitat de València for the implementation of the Sustainable Development Goals (SDG). From the Physics subject, we propose to perform activities that allow a reflection about the role of Physics to achieve the SDGs.

PREVIOUS KNOWLEDGE

RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

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

OTHER REQUIREMENTS

It is recommended that students have previously studied the subjects of Mathematics II and Physics in 2nd year Bachillerato (Sixth Form Senior High School). The prerequisites are: operation with logarithms and fractions; derivative and integration of elementary functions; basic trigonometry: sine, cosine, tangent; solution of equations of first and second degree; exponential equations

COMPETENCES / LEARNING OUTCOMES

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Act with autonomy in learning, making informed decisions in different contexts, issuing judgements based on experimentation and analysis, and transferring knowledge to new situations.

Apply the scientific method and acquire skills in handling the main bibliographic sources.

Basic and applied research: Gain an understanding of the nature of research in physics, of the ways in which it is conducted and of how research in physics is applicable to many different fields.

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

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

Demonstrate critical and self-critical thinking in the field of the degree programme, considering aspects such as professional ethics, moral values and the social implications of the different activities carried out.

Demonstrate learning ability.

Develop the profession with respect for other health professionals, acquiring teamwork skills.

Know and understand, within the field of the degree programme, gender inequalities in society; integrate different needs and preferences based on sex and gender into the design of solutions and problem solving.

Know and understand the foundations of physics in its theoretical and experimental aspects, as well as the mathematical background required for its formulation.

Know how to communicate effectively, both orally and in writing, adapting to the characteristics of the

situation and the audience.

Know how to recognise, analyse and solve new problems and develop and defend arguments.

Know the limits of the profession and its competencies, identifying when interdisciplinary treatment or referral to another professional is necessary.

Module: Physics and Mathematics. Apply computational and data processing techniques in relation to information on physical, chemical and biological data.

Module: Physics and Mathematics. Apply knowledge of Physics and Mathematics to pharmaceutical sciences.

Obtain adequate, diverse and up-to-date information.

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

Understand theoretically physical phenomena: have a good understanding of the most important physical theories (logical and mathematical structure, experimental support, physical phenomena described).

DESCRIPTION OF CONTENTS

1. MAGNITUDES AND MEASUREMENTS

Physical magnitudes and units. Estimation of uncertainties. Results presentation. Interpolation. Least squares regression.

2. IDEAL FLUIDS

Definition of fluid. Concept of pressure. Pascal's Principle. Types of flows. Continuity Equation. Bernoulli's Principle. Fundamental equation of hydrostatics. Venturi's effect. Torricelli's law. Arquimedes' Principle. Measurements of pressure and its applications.

3. REAL FLUIDS

Definition of viscosity. Navier's hypothesis. Hagen-Poiseuille equation. Reynolds number. Sedimentation velocity. Newtonian and non-Newtonian fluids. Rheology models. Measurements of viscosity and applications.

Surface tension. Contact angle. Laplace Equation. Jurin's law. Tate Equation. Measurements of surface

4. SURFACE PHENOMENA

tension. Surfactants and applications.

5. INTRODUCTION TO THERMODYNAMICS

Basic definitions. Concept of temperature and Zeroth Law of Thermodynamics. Thermometric scales. Measurements of temperature. Energy transfer as heat. Specific and latent heat. Calorimetric techniques. Heat propagation. Law of cooling. Applications of calorimetry and phase changes.

6. FIRST LAW OF THERMODYNAMICS

Thermodynamic work. Internal energy and Joule's experiment. First Law of Thermodynamics. Thermodynamics processes and Clapeyron diagram. Work, heat and internal energy variations calculations for an ideal gas. Graphical methods. Concept of enthalpy.

7. SECOND LAW OF THERMODYNAMICS

Justification of the second law. Thermal machines and Carnot's cycle. Statements of the Second Law of Thermodynamics. Definition of entropy. Reversible and irreversible processes. Entropy variations calculation for an ideal gas. Entropic diagrams. Thermodynamics applied to living beings.

8. WAVE MOTION

Basic concepts. Propagation equation. Energy, power and intensity. Attenuation, absorption and transmission. Doppler effect. Reflexion and refraction. Limit angle. Measure of the refraction index. Polarization. Interferences and diffraction.

9. ACOUSTICS AND OPTICS

Sound waves. Human hearing. Weber-Fechner law. Experiment of Fletcher and Mundson. Applications of ultrasounds. Vision optics. The human eye as a lens. Vision errors. Correction of refractive errors.

10. IONIZING RADIATION

X-rays and ionizing radiation. Basic concepts of atomic and nuclear physics: radioactivity. Physical and biological dosimetry. Radiopharmaceuticals.

11. LABORATORY SESSIONS

Measurement of density: solids
Measurement of density: solutions.
Measurement of viscosity: low viscosity fluids.
Measurement of viscosity: high viscosity fluids.
Measurement of surface tension.
Measurement of the cooling constant.
Measurements of sound intensity level.
Measurement of refraction index of solutions.

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Tutorials	2,00
Theory	41,00
Seminar	2,00
Laboratory	15,00
Total hours	**60,00**

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	0,00
Individual or group project	10,00
Independent study and work	20,00
Preparation of lessons	30,00
Preparation for assessment activities	30,00
Resolution of case studies	0,00
Total hours	**90,00**

TEACHING METHODOLOGY

The subject has four types of activities with a well-differentiated methodology: theory and problem classes, tutorials, seminars and practical laboratory classes.

• **Theory and problem classes:** in these classes the professor teaches the basics of the subject using the blackboard and the visual resources of the classroom. Students must acquire the basic knowledge of the syllabus through individual study and class attendance. The professor will provide different resources and bibliographic material through the virtual classroom to facilitate individual study and class preparation by students. There will also be a bulletin of problems and questions to be solved by the professor in class and by the students individually.

• **Tutorial classes:** doubts that have arisen in the theory and problem classes will be resolved. Different

activities will be proposed (problem solving, questionnaires, group work, etc.) that will allow students to better assimilate the concepts seen in the theory and problem classes, the qualification of which will form part of the continuous assessment.

• **Seminar classes:** these will be devoted to the deepening of some specific aspects of the subject and/or to show students the applications of the subject in the world of work. Activities will be proposed whose qualification will form part of the continuous assessment.

Attendance to tutorials and seminars is compulsory. The continuous assessment activities carried out in these classes are not recoverable.

• **Laboratory classes:** 8 laboratory practicals will be carried out in 4 sessions. These are taught by the professor in small subgroups (maximum of 16 students distributed in pairs). For each practical, the pair has to present a report of results. The format of the report will be proposed by the professor of each subgroup, and must include the experimental data taken during the practical, the results with the corresponding calculation of errors and an analysis of these results, and the main conclusions of the practical. The computers available in the laboratory may be used for making graphs and least squares regression, as well as any other data processing.

EVALUATION

The final assessment of the subject in the first call consists of 10% continuous assessment, 20% laboratory practices and 70% of the theory exam.

Continuous assessment (10%): activities carried out throughout the course that may consist of questionnaires, problem solving, attendance at tutorials and seminars, etc.

Theory exam (70%): written theory exam that will consist of numerical questions and problems or conceptual or reasoning questions.

Laboratory (20%): completion of laboratory practices, of which 60% of the mark will correspond to the completion of reports with the results of the practices and the corresponding error calculation, and the remaining 40% will correspond to the completion of a short written test on basic concepts of the practices and error calculation. Attendance at laboratory sessions is mandatory, except for justified reasons. In this case, the practice must be made up in another laboratory group after notifying the corresponding teaching staff.

To pass the course, students must obtain the following minimum marks: 4 in the theory exam, 5 in the written laboratory test, 5 in the overall laboratory mark, and 5 in the overall mark for the course (marks out of 10).

In the second call, the same criteria as in the first call will be applied. In case of not passing the minimum grade in the laboratory part, a laboratory exam will be carried out in the second call.

If the student does not pass the course in the two calls of the course, the mark corresponding to the continuous assessment will not be maintained for subsequent courses. The overall laboratory mark will be maintained for three academic years if passed.

Evidence of copying or plagiarism in any of the assessable tasks will result in failure to pass the subject and in appropriate disciplinary action being taken. Please note that, in accordance with article 13. d) of the Statute of the University Student (RD 1791/2010, of 30 December), it is the duty of students to refrain from using or participating in dishonest means in assessment tests, assignments or university official documents. In the event of fraudulent practices, the ¿Action Protocol for fraudulent practices at the University of Valencia¿ will be applied (ACGUV 123/2020): https://www.uv.es/sgeneral/Protocols/C83.pdf

REFERENCES

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