COURSE DATA

Data Subject	
Code	33934
Name	Physics
Cycle	Grade
ECTS Credits	6.0
Academic year	2024 - 2025

Study (s)

Degree	Center	Acad. year	Period
1205 - Degree in Human Nutrition and Dietetics	Faculty of Pharmacy and Food Sciences	1	Second term

Subject-matter

Degree	Subject-matter	Character
1205 - Degree in Human Nutrition and Dietetics	4 - Physics	Basic Training

Coordination

Name	Department
DELEGIDO GOMEZ, JESUS VALERIANO	345 - Earth Physics and Thermodynamics
HERNANDEZ LUCAS, MARIA JESUS	345 - Earth Physics and Thermodynamics

SUMMARY

This course is intended for students to start on the concepts and physical phenomena of interest in issues related to food and Human nutrition.

The course is divided into four parts: errors and units, fluid mechanics, thermodynamics and wave phenomena. Lectures and exercises are given in the classroom with the entire group. Experiments are performed in the laboratory into small groups of 16 students. Also 2 seminars and 2 tutorials (40 and 16 students, respectively) are part of the course

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 the student had taken Physics and Mathematics courses in Secondary School

COMPETENCES (RD 1393/2007) // LEARNING OUTCOMES (RD 822/2021)

1205 - Degree in Human Nutrition and Dietetics

- Knowledge and understanding of the fundamentals of physics in theoretical and experimental aspects, and the mathematical background needed for its formulation.
- Desarrollo de habilidades de aprendizaje necesarias para emprender estudios posteriores con un elevado grado de autonomía.
- Problem solving: be able to evaluate clearly the orders of magnitude in situations which are physically different, but show analogies, thus allowing the use of known solutions in new problems.
- Theoretical understanding of physical phenomena: have a good understanding of the most important physical theories (logical and mathematical structure, experimental support, described physical phenomena).

LEARNING OUTCOMES (RD 1393/2007) // NO CONTENT (RD 822/2021)

• To know the International System units and assign them correctly to each physical quantity. To use the error analysis and linear regression.

• To apply the principles of mechanics to fluid systems. To understand the concept of pressure and Archimedes' principle. To introduce the concept of viscosity and its effect on the Poiseuille’s flow. To understand the surface phenomena and their applications.

• To understand temperature, applying the equation of state of ideal gas heat and conservation of energy in the first principle. To calculate the thermodynamic variables and functions for an ideal gas.

• To know and understand the basic phenomena of waves in order to understand the mechanisms of hearing and vision.

• To solve numerical problems by reasoned application of theoretical concepts.

• To obtain and interpret results from experimental data

DESCRIPTION OF CONTENTS

1. MEASUREMENTS AND UNITS

International System of Units. Errors as uncertainties. Absolute and fractional uncertainties. How to report a measurement. Estimation of uncertainties: direct measurements and propagation of uncertainties. Interpolation. Least-squares fitting

2. IDEAL FLUIDS

Pressure. Fundamental equation of fluid statics. Pascal and Archimedes principles. Continuity equation. Bernoulli equation.

3. VISCOUS FLUIDS

Laminar and turbulent flow. Viscosity. Poiseuille equation. Sedimentation. Non-Newtonian Fluids. Rheology and texture of foods

4. SURFACE TENSION

Definition of Surface Tension. Surfactants. Contact angle. Young-Laplace equation.
Capillary action. Drop formation

5. HEAT AND TEMPERATURE

Thermodynamic systems.
Temperature and Zeroth Law.
Thermometers and temperature scales.
Equation of state. Thermodynamic diagrams.
Specific heat capacity and latent heat.
Humidity measurement. Human metabolism

6. FIRST LAW OF THERMODYNAMICS

Introduction
Work. Internal Energy
First Law of Thermodynamics. Applications
Energy balance in human body

7. WAVES

Definition of a wave. Propagation equation
Energy and intensity
Attenuation and Absorption
Doppler effect
Refractive index. Refraction and reflection.
Snells law. Critical angle

8. ACUSTICS

Sound as a pressure wave.
Propagation of sound
Perception of sound. Weber-Fechner Law
The human ear
Ultrasounds and infrasounds

9. VISION

The human eye
The visual process
Correction of vision problems

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	38,00	100
Laboratory practices	15,00	100
Seminars	2,00	100
Tutorials	2,00	100
Development of group work	10,00	0
Development of individual work	5,00	0
Study and independent work	20,00	0
Readings supplementary material	5,00	0
Preparation of evaluation activities	25,00	0
Preparing lectures	5,00	0
Preparation of practical classes and problem	20,00	0
TOTAL	**147,00**	

TEACHING METHODOLOGY

In theoretical lectures, the main concepts of the course will be introduced. Special attention will be paid on the practical applications of these concepts and some illustrative examples will be given. The participation of the students will be encouraged.

A collection of problems for each unit will be given to the students. Some of these problems will be solved during the classes as examples, and some others will be assigned to the students, in order to be solved at home.

In the tutorials, with groups of 16 students, questions and exercises previously solved by the students will be discussed. The work of students in these sessions will be part of the evaluation, together with the results of multiple choice tests included in Aula Virtual.

In seminars (groups of 40 students), oral presentation of previously proposed subjects will be presented by small groups of 3-5 students. Also a written report (minimum 10 pages 5000-8000 words) and a work diary must be prepared.

In laboratory, 8 experiments will be performed in 4 sessions. Groups of 16 students will be organized, working in couples. A report including experimental data, analysis (errors, graphs), and conclusions will be evaluated. The use of computer programs (such as spreadsheet programs) will be encouraged to analyse the data using the laboratory computers. Assistance to laboratory is compulsory.

During the activities, both theoretical and practical, examples of how the subject should be applied in relation to the Sustainable Development Goals (SDGs) will be given. The SDGs will also be taken into account in the proposals of topics for the coordinated seminars. This will provide students with knowledge, skills and motivation to understand and manage these SDGs, while promoting reflection and criticism.

EVALUATION

The theoretical part of the course is assessed mainly from a written examination which consists in solving various theoretical questions, and numerical exercises. The results of seminars oral presentations and activities in the tutorials will be considered.

Laboratory classes will be evaluated based on reports made about the experiments performed.
The score is distributed as follows:

LABORATORY 20%

CLASSROOM

Oral presentations: 10%

Tutorial and tests: 10%

Exam: 60%

In order to pass more than 50% must be got. A minimum of 4/10 in the exam and 5/10 points in the rating of the laboratory are necessary.

REFERENCES

Basic

- Herráez, J. V. y Delegido, J., 2013. Elementos de Física Aplicada y Biofísica. Valencia: PUV, Universitat Valencia
- Tipler, P.A. y Mosca. G., 2010. Física para la ciencia y la tecnología, Volumen 1. Barcelona: Ed. Reverté. 6ª edición, 2010
- Giancoli, D., 2002. Física para universitarios. Méjico: Ed. Douglas

Additional

- Frumento, A., 1995. Biofísica. Barcelona: Mosby: Doyma Libros
- Jou, D., Llebot, J. E. y Pérez García, C., 2008. Física para las ciencias de la vida. Madrid: McGraw-Hill