COURSE DATA

DATA SUBJECT

Code: 36360
Name: Physic
Cycle: Undergraduate Studies
ECTS Credits: 6
Academic year: 2025-26

STUDY (S)

Degree	Center	Acad. year	Period
1212 - Degree in Gastronomic Sciences	Facultat de Farmácia i Ciències de L'alimentació	1	First quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
1212 - Degree in Gastronomic Sciences	Physic	BASIC

COORDINATION

PEDROS ESTEBAN ROBERTO

SUMMARY

Physics is a first-year 6-credits quarterly core subject taught in the first quarter of the academic year.
This course is intended for students to start on the concepts and physical phenomena of interest in issues related to gastronomy and its research.

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 smaller groups of 16 students.

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 strongly recommended that the student had taken Physics and Mathematics courses in Secondary School. Otherwise, the students will have to work harder to stand on an equal footing with the rest of the

class.
Physics pre-requisites; Newton laws; force, work, energy and power; velocity; pressure; density; conservation of energy; waves.
Mathematics pre-requisites: solving linear and quadratic equations; solving systems of linear equations; solving exponential and logarithmic equations; derivative and in

COMPETENCES / LEARNING OUTCOMES

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Conocer los fundamentos de la Física en sus aspectos teóricos y experimentales y la influencia de factores físicos sobre componentes de los alimentos.

DESCRIPTION OF CONTENTS

1. MEASUREMENTS AND UNITS

Magnitudes in Physics. Units
Errors as uncertainties. Absolute and fractional uncertainties. How to report a measurement
Estimation of uncertainties: direct measurements and propagation of uncertainties
Data representation: tables and figures. Linear interpolation
Modelling. Linear fit. Model validation

2. IDEAL FLUIDS

What is a fluid? Pressure
Types of flows
Pascals Principle
Archimedess Principle
Hydrostatic pressure
Continuity equation
Bernoullis equation
Applications

3. VISCOUS FLUIDS

Viscosity.
Poiseuilles equation
Turbulence
Motion of a solid in a fluid
Newtonian and non-Newtonian fluids
Thickeners and gelifiers

4. SURFACE PHENOMENA

Surface tension
Drops and bubbles: Laplace equation
Liquid drop formation: Tate equation
Angle of contact
Capillarity
Emulsions and foams

5. HEAT AND TEMPERATURE

Introduction
Thermometric scales
Heat and work
Transfer of heat: applications to cooking and freezing.
Thermal properties: specific heat and thermal conductivity
Latent heat
Cooling

6. PRINCIPLES OF THERMODYNAMICS

First Principle of Thermodynamics. Energy
Energy requirements of people
Energy from food
Second Principle of Thermodynamics: Carnot. Clausius. Interpretation of entropy
Thermodynamics of the living systems
High cuisine Thermodynamics

7. WAVES

What a wave is
Mathematical description. Wave function
Wave propagation. Atenuation. Absorption. Doppler effect.
Applications

8. ACOUSTICS

Sound level
Acoustic sensibility
Food noise
Ultrasounds

9. IONIZING RADIATION

X rays. Applications
Radioactivity.
Half-life
Dosimetry
Applications in food industry

10. PHYSICS LABORATORY

Session # 1: Measurement of density of solids
Measurement of density of liquids
Session # 2: Measurement of viscosity (glass viscometetr): Newtonian fluids
Measurement of viscosity (glass viscometer): Non-Newtonian fluids
Session # 3: Measurement of surface tension: pendant drop method
Newton's cooling law
Session # 4: Sound measurements: sonometer
Measurement of the refractive index: refractometer

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Theory	45,00
Laboratory	15,00
Total hours	**60,00**

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	0,00
Individual or group project	15,00
Independent study and work	25,00
Preparation of lessons	25,00
Preparation for assessment activities	25,00
Resolution of case studies	0,00
Total hours	**90,00**

TEACHING METHODOLOGY

The classroom lectures will deal with the main concepts of the subject and their practical applications. The participation of the students will be encouraged.

The students can access to a collection of problems for each unit. The professor will solve some of these

problems in class, and some others will be assigned as homework.

The tutorial lectures may consist on groups of 16 students discussing especially interesting exercises with the professor. The work of the students during such sessions will be part of the marks.

The seminars consist on a written report (5000-8000 words), a work diary and an oral presentation about a topic suggested by the professor. The students will work in groups of 3-5 and the results will be part of the marks.

The laboratory consists on 8 experiments divided in 4 sessions, with 16 students and one professor. The students will work in pairs and will have to hand in a written report detailing: introduction; material and methods; results and discussions; conclusions. The use of spreadsheet applications will be encouraged, particularly during the laboratory session. Attendance to laboratory session is compulsory.

EVALUATION

Subject marking is divided in two blocks:

Theory (80% of the mark)
- written exam with theoretical questions and problems (70%)
- seminars, tutorials and classroom work (10%)

Laboratory (20% of the mark)
- written exam (10%)
- laboratory reports (10%)

The attendance of 100% of the laboratory is compulsory. Absence must be justified and will require the student to attend the session with another group.

It is necessary to get at least 4/10 mark in each item to pass Physics. If a student does not take the exam in both calls, the grade will be \\\"Not present\\\". If a student passes the laboratory part, the mark will be valid for two academic years. After that, the student will have to repeat the laboratory part.

REFERENCES

- Referencia b1: Herráez, J. V. y Delegido, J., 2011 Elementos de Física Aplicada y Biofísica. PUV, Universitat Valencia. Referencia b2: Davidovits P., 2008, Physics in Biology and Medicine. Academic Press. Referencia b3: McGee H., 2007, La cocina y los alimentos: enciclopedia de la ciencia y la cultura de la comida. Debate.

- Referencia c1: Tipler, P.A., 1992, Física, Reverté.
- Youssef J., 2016, Molecular Gastronomy at home, 2016, Firefly Books Ltd
- Logsdon J., Modernist cooking made easy, 2012, Logsdon