

Course Unit	Physics	Field of study	Physics
Bachelor in	Food Engineering	School	School of Agriculture
Academic Year	2025/2026	Year of study	1
Type	Semestral	Semester	1
Workload (hours)	162	Contact hours	T - TP - PL - TC - S - E - OT - O -
		Level	1-1
		ECTS credits	6.0
		Code	9087-641-1103-00-25

T - Lectures; TP - Lectures and problem-solving; PL - Problem-solving, project or laboratory; TC - Fieldwork; S - Seminar; E - Placement; OT - Tutorial; O - Other

Name(s) of lecturer(s) Amílcar Manuel Lopes António

Learning outcomes and competences

At the end of the course unit the learner is expected to be able to:

1. Recognize the importance of some fundamental laws of physics to explain some phenomena. Make the connection between these laws to explain some simple technological applications.
2. Recognizing the importance of different systems of units, measurements, accuracy and precision. Distinguish and quantify vector and scalar quantities.
3. Determine positions, speeds and accelerations. Calculate forces and moments.
4. Understand different properties of some fluids. Calculate densities and pressures. Determine pressure values at different points. Calculate flux values, speed and pressure fluids flow.
5. Acquire the basic notions of temperature, heat transfer and heat.
6. Determine electrostatic force values and electric fields. Quantify electric current and its effects. Determine field values and magnetic force. Quantify induced voltages and current.

Prerequisites

Before the course unit the learner is expected to be able to:
Mathematics, Physics or Chemistry at the level of Secondary Education.

Course contents

1. Introduction: measurements; units; vectors
2. Mechanics
3. Fluid Mechanics
4. Thermodynamics
5. Electricity and Magnetism

Course contents (extended version)

1. Introduction
 - Measurements; units; vectors
2. FLUIDS
 - Density, Viscosity, Surface Tension, Capillarity. Pressure.
 - Fundamental Law of Hydrostatics. Pascal's Principle, Archimedes' Principle.
 - Volumetric and Mass Flow. Continuity Equation, Bernoulli's Equation.
 - Real Fluids: Poiseuille's Equation; Reynolds Number.
3. THERMODYNAMICS
 - Zeroth Law and Temperature
 - First Law
 - Second Law and Entropy
 - Carnot cycle and thermal machines efficiency
4. ELECTRICITY AND MAGNETISM
 - Electric Charge. Electrical Force. Electric Field. Potential. Potential energy.
 - Voltage, Current, Electric Resistance. Simple Electric models: Kirchoff's laws.
 - Magnetic field and electric current: Biot-Savart's Law. Magnetic force: Lorentz's equation.
 - Magnetic flux and magnetic induction: Faraday's Law.

Recommended reading

1. "Física - textos e problemas" (www. esa. ipb. pt/grupofis). A. L. ANTÓNIO
2. Haliday D. , Resnick R. e Walker; Fundamentos de Física; Volumes 1, 2 e 3. Livros Técnicos e Científicos Editora S. A.
3. Alonso M. , Finn E. J. ; Física; Addison-Wesley
4. Haliday D. , Resnick R. , Walker J. ; Fundamentals of Physics, John Wiley

Teaching and learning methods

Presentation of fundamental concepts in the proposed content. Resolution of some numerical problems and conducting some experiments, by the teacher and others in collaboration with the students.

Assessment methods

- Alternative 1 - (Regular, Student Worker) (Final, Supplementary, Special)
 - Final Written Exam - 60%
 - Intermediate Written Test - 40%

Language of instruction

1. Portuguese
2. Portuguese, with additional English support for foreign students.

Electronic validation

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13-01-2026	15-01-2026	16-01-2026	04-02-2026