

Applied Physics (3 CFU; 26 hours – 22 T + 4 Ex)

Learning objectives: after completing the course the student acquires the methodological bases of the scientific method, as well as a general knowledge of the main phenomena of Classical Physics; besides, he/she can solve problems regarding Dynamics, Thermodynamics and Electromagnetism.

Subjects and acquired skills	Topics	Specific contents	Hours
INTRODUCTION TO THE COURSE (TOT. 0,5 HOURS)		<i>Presentation of the program and of the assessment methods of the student's advancement and skills; teaching materials.</i>	0,5
1. SCIENTIFIC METHOD (TOT. 1,5 HOURS) <i>(acquisition of basic knowledge relative to the principles of the scientific method and, in particular, to the concepts of measurements, errors and modelling)</i>	Measurements and errors	Introduction to the scientific method; physical quantities; direct and indirect measurements; units of measure; statistical and systematic errors; propagation of errors; precision and accuracy; dimensional analysis.	0,5
	Theories and models	Analytical description of measures; laws of Nature; problem-solving methods in Physics; introduction to Classical Physics.	1
2. MECHANICS (TOT. 12 HOURS) <i>(acquisition of basic knowledge relative to classical dynamics; acquisition of the ability to solve problems regarding one-dimensional and two-dimensional kinematics, point-like and rigid body dynamics, multibody systems and fluidodynamics)</i>	Kinematics	Position, distance and displacement; velocity, acceleration; uniform linear motion; uniformly accelerated motion; scalar and vector quantities; motion in two dimensions.	3
	Dynamics	Force and mass; Newton's three laws of motion; normal forces; frictional forces; ropes and springs; circular motion.	3
	Energy	Work; kinetic energy; conservative and non-conservative forces; potential energy; conservation of energy.	2
	Gravitation	Newton's law of universal gravitation; gravitational potential energy.	1
	Fluids	Density; pressure; Archimedes' principle; Bernoulli's equation.	3
3. THERMODYNAMICS (TOT. 4 HOURS) <i>(acquisition of basic knowledge relative to classical thermodynamics; acquisition of the ability to solve problems regarding thermology and thermodynamics)</i>	Temperature and heat	Temperature; heat; kinetic theory; phase transitions.	2
	Thermodynamics	The three laws of thermodynamics; thermodynamic processes; heat engines; entropy.	2

4. ELECTROMAGNETISM (TOT. 4 HOURS) (acquisition of basic knowledge relative to electromagnetism, electrical networks and electromagnetic waves; acquisition of the ability to solve problems regarding electrostatics, magnetism and electrical networks)	Electrostatics	Electric charges; electrical insulators and conductors; Coulomb's law; electric field; electric potential.	2
	Magnetism	Magnetic field; magnetic forces; Ampère's circuital law; magnetism in matter; Faraday's law.	1
	Electromagnetic waves	Production and propagation of electromagnetic waves; electromagnetic spectrum.	1
EXERCISES (TOT. 4 HOURS)		Mock exams.	4