UNIVERSITÀ DI PAVIA

Anno Accademico 2021/2022

PHYSICS II

Enrollment year	2020/2021
Academic year	2021/2022
Regulations	DM270
Academic discipline	FIS/03 (MATERIAL PHYSICS)
Department	DEPARTMENT OF ELECTRICAL,COMPUTER AND BIOMEDICAL ENGINEERING
Course	INDUSTRIAL ENGINEERING
Curriculum	PERCORSO COMUNE
Year of study	2°
Period	1st semester (27/09/2021 - 21/01/2022)
ECTS	6
Lesson hours	50 lesson hours
Language	Italian
Activity type	WRITTEN AND ORAL TEST
Teacher	BAJONI DANIELE (titolare) - 6 ECTS
Prerequisites	Student's are supposed to be familiar with the basic concepts Mechanics (Newton's Laws, cinematics, Energy and Momentum conservation principles and Thermodynamics), Mathematical Analysis (Module A and B) and Geometry
Learning outcomes	The aim of the course is to introduce the basic concepts of Electromagnetism.
Course contents	Electrostatics Electric Charge: phenomenology. Coulomb's Law, Superimposition Principle Electric Field Electric Flux, Gauss Law Electrostatic Potential Energy and Electrostatic Potential

	Maxwell's Equation for the Electrostatics Electric Field in the Matter Behaviour of Conductors in presence of an Electrostatic Field Capacitance Electric Dipole Dielectrics and Polarization (microscopic and macroscopic description) boundary conditions for E and D fields Electric Current Drude model of Electrical Conduction Ohm's Law, Resistance Charge Conservation Principle, Continuity Equation Kirchhoff laws RC circuits Magnetostatic Phenomenology of Magnetism Gauss Law for Magnetic Field Charge in motion in a Magnetic Field, Lorentz Force Biot-Savart Law Ampere's Law Magnetic Fields in the matter Phenomenological consideration Dia- Para- and Ferro-Magnetism M and H vectors Ampere's Law for H field Electromagnets and Hysteresis Cycle Non-Stationary Fields Faraday's Law of Induction, non-conservative Fields Displacement current and Ampler-Maxwell equation Energy of the magnetic field, Inductance RL circuits Maxwell Equations in non-stationary conditions Introduction to Electromagnetic Waves Electromagnetic wave's equation Plane wave solution Properties of the pane waves Poynting Vector
Teaching methods	Lectures (hours/year in lecture theatre): 38 Practical class (hours/year in lecture theatre): 12
Reccomended or required	There are many beautiful books treating all the arguments presented in

readings	this course, especially in English. Just to mention some of them... Giancoli, D. C.. Physics for Scientists & Engineers. Vol. 2. Prentice Hall. Serway and Jewett. Physics for Scientists and Engineers 6E . Paul Tipler. Physics for Scientists and Engineers: Vol. 2: Electricity and Magnetism, Light . E. Purcell. Electricity and Magnetism (Berkeley Physics Course, Vol. 2).
Assessment methods	The first part of the exam will test the student's ability in solution of problems (script: 6 problems/2 hours). The oral part of the exam is not compulsory. More information (in italian) are available in the official website of the course. Oral examination, with questions aiming at understanding which are the concepts acquired by the student and his/her ability to explain the topics discussed in the course. The minimum score to pass the exam is 18/30, the maximum score is 30/30 cum laude.
Further information	The first part of the exam will test the student's ability in solution of problems (script: 6 problems/2 hours). The oral part of the exam is not compulsory. More information (in italian) are available in the official website of the course. Oral examination, with questions aiming at understanding which are the concepts acquired by the student and his/her ability to explain the topics discussed in the course. The minimum score to pass the exam is 18/30, the maximum score is 30/30 cum laude.
Sustainable development goals - Agenda 2030	$lbl_legenda_sviluppo_sostenibile