UNIVERSITÀ DI PAVIA

Anno Accademico 2021/2022

SPECTROSCOPY OF MATERIALS

Enrollment year	2020/2021
Academic year	2021/2022
Regulations	DM270
Academic discipline	FIS/03 (MATERIAL PHYSICS)
Department	DEPARTMENT OF PHYSICS
Course	
Curriculum	Fisica della materia
Year of study	2°
Period	1st semester (04/10/2021 - 19/01/2022)
ECTS	6
Lesson hours	56 lesson hours
Language	Italian
Activity type	ORAL TEST
Teacher	PATRINI MADDALENA (titolare) - 3 ECTS GALINETTO PIETRO - 3 ECTS
Prerequisites	Basics of Electromagnetism, Quantum Mechanics, and Physics and Chemistry of matter
Learning outcomes	Illustrate the physical bases and experimental problems typical of solid state spectroscopies, in relation to the different types of materials and their applications. The aim of the course is to provide the student with the critical ability to choose the most appropriate procedures and techniques for the study of the material under examination, to analyze its structural, compositional, optical, electronic and vibrational properties.
Course contents	General topics concerning spectroscopy are first presented: radiation-matter interaction, the dielectric function of materials, classical and quantum treatments of optical transitions, vibrational response, excitations in solids. Specific optical spectroscopies and their application in materials are then illustrated: reflectance, transmittance,

	absorbance with spectrophotometers; spectroscopic ellipsometry; Raman scattering, luminescence and excitation spectroscopies; electronic paramagnetic resonance spectroscopy; time-resolved spectroscopies. Complementary techniques for topographic and morphological imaging, such as scanning probe microscopies (electron, force, electric, magnetic microscopies) are also presented.
Teaching methods	The course program includes both lectures and laboratory experiments on the materials of interest for basic and applied research.
Reccomended or required readings	H. Kuzmany Solid State Spectroscopy: an introduction (Springer 2009) Handbook of Spectroscopy, G. Gauglitz & T. Vo-Dinh editors (Wiley, 2003) and other material provided by the teachers.
Assessment methods	Oral examination. In the first part, the student must expose in a concise way his own report on the results of a spectroscopic methodology/technique (among those object of the course, making use of one or more scientific publications, agreed with the teachers), proving to know the physical fundamentals, the involved materials and the experimental problems. In the second part the student must demonstrate an adequate knowledge of the topics covered in the course and not included in the above presentation.
Further information	
Sustainable development goals - Agenda 2030	$lbl_legenda_sviluppo_sostenibile