



Subject card

Subject name and code	, PG_00070384						
Field of study	Materials Engineering, Materials Engineering						
Date of commencement of studies	October 2025	Academic year of realisation of subject				2026/2027	
Education level	first-cycle studies	Subject group				Obligatory subject group in the field of study Subject group related to scientific research in the field of study	
Mode of study	Full-time studies	Mode of delivery				at the university	
Year of study	2	Language of instruction				Polish	
Semester of study	4	ECTS credits				1.0	
Learning profile	general academic profile	Assessment form				assessment	
Conducting unit	Institute of Nanotechnology and Materials Engineering -> Faculty of Applied Physics and Mathematics -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Agnieszka Witkowska				
	Teachers		dr hab. inż. Agnieszka Witkowska				
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	0.0	0.0	0.0	15
	E-learning hours included: 0.0						
eNauczenie source address: https://enauczenie.pg.edu.pl/moodle/course/view.php?id=18287							
Learning activity and number of study hours	Learning activity	Participation in didactic classes included in study plan		Participation in consultation hours		Self-study	SUM
	Number of study hours	15		2.0		8.0	25
Subject objectives	The aim of the course is to discuss the theoretical and practical issues of spectroscopy and presentation of the various types of spectroscopic methods, the ways to collect and interpret spectra.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K6_U02] Can operate typical laboratory equipment and analyze material tests	The student learns the tools and methods of recording spectra, acquires the ability to analyze spectra and interpret the obtained results.			[SU3] Assessment of ability to use knowledge gained from the subject		
	[K6_W02] has knowledge of physics and chemistry, useful for formulating and solving simple problems within the scope of materials science	The student acquires knowledge of physics that allows him to solve simple tasks and problems in the field of spectroscopy and optical properties of materials.			[SW1] Assessment of factual knowledge		
	[K6_W06] Knows selected methods, techniques, tools and materials used in solving simple engineering problems within the scope of materials engineering.	Student become acquainted with modern spectroscopic methods used in the study of structural and physicochemical properties of materials.			[SW1] Assessment of factual knowledge		
Subject contents	Course content – lecture 1. Introduction to spectroscopy, types of spectroscopy 2. Theoretical description of electromagnetic radiation (EM); 3. Matter (atom, molecule, solid state); 4. Spectrum and ways of its registration; 5. Vibrational spectroscopy (FTIR); 6. Raman spectroscopy; 7. UV-Vis spectroscopy; 8. Photoelectron spectroscopy (PES);						
Prerequisites and co-requisites	Course subjects in classical and modern physics, physics of materials, inorganic chemistry and experimental methods in materials engineering.						
Assessment methods and criteria	Subject passing criteria		Passing threshold		Percentage of the final grade		
	Written test		50.0%		100.0%		

Recommended reading	Basic literature	[1] J.Sadlej, Molecular Spectroscopy, WNT, Warszawa (in Polish) [2] D.L.Pavia i in., Introduction to Spectroscopy, Brooks/Cole
	Supplementary literature	[3] C.D.Wagner i in. Handbook of photoelectron spectroscopy, Perkin-Elmer Corporation
	eResources addresses	
Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none"> 1. What is a spectroscopy? 2. What is a spectrum? Specify and describe the main parameters that characterize the spectral line shape. 3. List and describe the main causes of spectral lines broadening. 4. Formulate and explain Beer-Lambert law and define attenuation length. 5. Schematically represent and discuss the energy level diagram of a molecule. 6. Raman spectroscopy: describe the origin and the idea of the phenomenon and shape of Raman spectrum. 7. What is the auxochrome and how it can change the UV-Vis spectrum? 8. Why photoelectron spectroscopy is a surface sensitive technique? 	
Practical activities within the subject	Not applicable	

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