GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	, PG_00070384		
Field of study	Materials Engineering, Materials Engineering		
Date of commencement of studies	October 2024	Academic year of realisation of subject	2025/2026
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

eNauczanie source address: https://enauczanie.pg.edu.pl/moodle/course/view.php?id=18287

Moodle ID: 3166 Metody spektroskopowe
https://enauczanie.pg.edu.pl/2025/course/view.php?id=3166

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.

<table>
<tr><td>Assessment methods and criteria</td><td colspan="2"><table><tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr><tr><td>Written test</td><td>50.0%</td><td>100.0%</td></tr></table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td>[1] J.Sadlej, Molecular Spectroscopy, WNT, Warszawa (in Polish)

[2] D.L.Pavia i in., Introduction to Spectroscopy, Brooks/Cole</td></tr>
<tr><td>Supplementary literature</td><td>[3] C.D.Wagner i in. Handbook of photoelectron spectroscopy, Perkin-Elmer Corporation</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="2">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?</td></tr>
<tr><td>Practical activites within the subject</td><td colspan="2">Not applicable</td></tr>
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