GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Principles of Spectroscopic Techniques, PG_00050110		
Field of study	Biomedical Engineering, Biomedical Engineering, Biomedical Engineering		
Date of commencement of studies	October 2023	Academic year of realisation of subject	2026/2027
Education level	first-cycle studies	Subject group	Optional subject group 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	4	Language of instruction	Polish
Semester of study	7	ECTS credits	2.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Division of Complex Systems Spectroscopy -> Institute of Physics and Applied Computer Science -> Faculty of Applied Physics and Mathematics -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Marcin Dampc	
	Teachers	dr inż. Marcin Dampc	

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	0.0	0.0	15.0	0.0	30

E-learning hours included: 0.0

eNauczanie source addresses:

Moodle ID: 9125 Podstawy technik spektroskopowych 2026/2027
https://enauczanie.pg.edu.pl/2025/course/view.php?id=9125

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	30	2.0	18.0	50

Subject objectives

Presenting basic concepts of optical spectroscopy and physics behind the designated methods. Learning the skill of selecting appropriate technique for a specific physical/chemical/medical problem and learning about the limitations of each experimental technique.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W02] knows and understands, to an advanced extent, selected laws of physics and physical phenomena as well as methods and theories explaining the complex relationships between them, constituting the basic general knowledge in the field of technical sciences related to the field of study	Describes interactions of electromagnetic radiation with matter based on quatum mechanics, electromagnetism and atomic physics.	[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge
[K6_W54] Knows and understands, to an advanced extent, selected aspects of biomedical diagnostics	Is capable of selecting appropriate spectrometry technique for investigating specific property of matter.	[SW3] Assessment of knowledge contained in written work and projects

<table>
<tr><td>Subject contents</td><td>Course content – lecture
Introduction

Basics in optical spectroscopy

Electromagnetic radiation

Quantization of energy

Emission and absorption of radiation

Optical spectroscopic equipment

Optical monochromators and spectrographs

Interferometers

Detectors

Infrared, absorption, Fourier, Raman, laser and microwave spectroscopy

Rotational spectra

Vibrational spectra

Raman spectra</td></tr>
<tr><td>Prerequisites and co-requisites</td><td></td></tr>
<tr><td>Assessment methods and criteria</td><td><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>lecture</td><td>40.0%</td><td>65.0%</td></tr>
<tr><td>project</td><td>80.0%</td><td>35.0%</td></tr>
</table></td></tr>
<tr><td>Recommended reading</td><td><table>
<tr><td>Basic literature</td><td>1. W. Demtröder, Spektroskopia laserowa, PWN, Warszawa 1993.
2. Z. Kęcki, Podstawy spektroskopii molekularnej, Wydawnictwo Naukowe PWN, Warszawa 1992.
3. J. M. Hollas, High resolution spectroscopy, J. Wiley & sons, New York 1998.
4. H. Barańska, A. Łabudzińska, J. Terpiński, Laserowa spektrometria ramanowska, PWN, Warszawa 1981.
5. D. Kunisz, Fizyczne podstawy emisyjnej analizy widmowej, PWN, Warszawa 1973.
6. H. Haken, H. C. Wolf, Fizyka molekularna z elementami chemii kwantowej, Wydawnictwo Naukowe PWN, Warszawa 1998.
7. C. N. Banwell, Fundamentals of molecular spectroscopy, McGraw-Hill, London 1983</td></tr>
<tr><td>Supplementary literature</td><td>-</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
</table></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td>Select appropriate experimental technique to obtain the chemical bond length in CO molecule. Based on avaliable measurement results make calculations.</td></tr>
<tr><td>Practical activites within the subject</td><td>Not applicable</td></tr>
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