



## 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 2020	Academic year of realisation of subject			2023/2024		
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	Zakład Spektroskopii Układów Złożonych -> Instytut Fizyki i Informatyki Stosowanej -> Faculty of Applied Physics and Mathematics						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Marcin Dampc				
	Teachers		dr inż. Marcin Dampc				
Lesson types and methods of instruction	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						
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_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		
	[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 quantum mechanics, electromagnetism and atomic physics.			[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects		

Subject contents	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		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	lecture	40.0%	65.0%
	project	80.0%	35.0%
Recommended reading	Basic literature	<ol style="list-style-type: none"> <li>1. W. Demtröder, Spektroskopia laserowa, PWN, Warszawa 1993.</li> <li>2. Z. Kęcki, Podstawy spektroskopii molekularnej, Wydawnictwo Naukowe PWN, Warszawa 1992.</li> <li>3. J. M. Hollas, High resolution spectroscopy, J. Wiley &amp; sons, New York 1998.</li> <li>4. H. Barańska, A. Łabudzińska, J. Terpiński, Laserowa spektrometria ramanowska, PWN, Warszawa 1981.</li> <li>5. D. Kunisz, Fizyczne podstawy emisyjnej analizy widmowej, PWN, Warszawa 1973.</li> <li>6. H. Haken, H. C. Wolf, Fizyka molekularna z elementami chemii kwantowej, Wydawnictwo Naukowe PWN, Warszawa 1998.</li> <li>7. C. N. Banwell, Fundamentals of molecular spectroscopy, McGraw-Hill, London 1983</li> </ol>	
	Supplementary literature	-	
	eResources addresses		
Example issues/ example questions/ tasks being completed	Select appropriate experimental technique to obtain the chemical bond length in CO molecule. Based on available measurement results make calculations.		
Work placement	Not applicable		