



## Subject card

Subject name and code	Vacuum technology, PG_00037288						
Field of study	Technical Physics						
Date of commencement of studies	October 2020	Academic year of realisation of subject			2022/2023		
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	3	Language of instruction			Polish		
Semester of study	5	ECTS credits			2.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Department of Atomic, Molecular and Optical Physics -> Faculty of Applied Physics and Mathematics						
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Sebastian Bielski					
	Teachers	dr inż. Sebastian Bielski					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	15.0	0.0	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	Knowledge of the following concepts concerning modern vacuum technology: properties of gases surface processes (adsorption and desorption) creating a vacuum measuring a vacuum vacuum components, construction, and leak detection						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	K6_W08	The student is able to plan and prepare for a complex laboratory exercise.			[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge		
	K6_U04	Students gain laboratory experience during the classes within the Vacuum Technics Laboratory			[SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment		
	K6_W07	The student gains knowledge about construction, operation and use of vacuum devices.			[SW1] Assessment of factual knowledge		
	K6_U02	The student is able to run, test and use vacuum devices for experimental purposes.			[SU2] Assessment of ability to analyse information [SU1] Assessment of task fulfilment		
Subject contents	1) The concept of vacuum in physics and technology 2) The properties of dilute gases 3) The gas flow and surface phenomena 4) Vacuum preparation 5) Mechanical vacuum pumps 6) Jetvacuum pumps 7) Sorption pumps 8) Vacuum measurement 9) Leak Detection 10) Elements of vacuum systems						
Prerequisites and co-requisites	None						

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	written test	50.0%	51.0%
	Laboratories, reports, oral presentations	100.0%	49.0%
Recommended reading	Basic literature	S. Bielski, materials published on the moodle platform <a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=15016">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=15016</a> "Modern vacuum physics" Austin Chambers CRC Press 2004	
	Supplementary literature	Materials and data available on the websites <a href="https://www3.nd.edu/~nsl/Lectures/urls/LEYBOLD_FUNDAMENTALS.pdf">https://www3.nd.edu/~nsl/Lectures/urls/LEYBOLD_FUNDAMENTALS.pdf</a> <a href="http://www.idealvac.com/files/manuals/Kinney_Piston_Vacuum_Pump_Brochure.pdf">http://www.idealvac.com/files/manuals/Kinney_Piston_Vacuum_Pump_Brochure.pdf</a> <a href="https://www.agilent.com/cs/library/catalogs/public/05_Diffusion_Pumps.pdf">https://www.agilent.com/cs/library/catalogs/public/05_Diffusion_Pumps.pdf</a> <a href="http://www.idealvac.com/files/literature/03_Edwards_2011_Vapour_Diffusion_Pumps.pdf">http://www.idealvac.com/files/literature/03_Edwards_2011_Vapour_Diffusion_Pumps.pdf</a> <a href="http://www.idealvac.com/files/brochures/Pfeiffer-Adixen-Leak-Detectors-Brochure.pdf">http://www.idealvac.com/files/brochures/Pfeiffer-Adixen-Leak-Detectors-Brochure.pdf</a>	
	eResources addresses	Adresy na platformie eNauczanie: Technika próżniowa_22/23 - Moodle ID: 23587 <a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=23587">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=23587</a>	
Example issues/ example questions/ tasks being completed	Project of the UHV system. Physical basis of the vacuum measurements. Construction, operation and properties of a rotary pump.		
Work placement	Not applicable		