



Subject card

Subject name and code	Vacuum technology, PG_00037288						
Field of study	Technical Physics						
Date of commencement of studies	October 2024		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	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 Physics and Luminescence -> Faculty of Applied Physics and Mathematics -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Sebastian Bielski				
	Teachers						
Lesson types	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						
	eNauczanie source addresses: Moodle ID: 2907 Technika próżniowa (od 2026/27) https://enauczanie.pg.edu.pl/2025/course/view.php?id=2907						
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	<p>The aim of the course is to provide knowledge of modern vacuum technology, with particular focus on the following topics:</p> <ul style="list-style-type: none">• properties of gases• surface processes (adsorption, desorption)• vacuum generation• vacuum measurement• components of vacuum systems, construction, leak detection.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K6_U04] plans and conduct experiments, critically analyzes their results, draw conclusions and forms opinions, has laboratory work experience	Laboratory experience within the Vacuum Technology Laboratory.	[SU1] Assessment of task fulfilment
	[K6_U02] analyzes and solves simple scientific and technical problems, based on possessed knowledge, using analytical, numerical, simulation and experimental methods	Ability to start up, test, and use a vacuum device for experimental purposes.	[SU1] Assessment of task fulfilment
	[K6_W07] has knowledge of the construction and operation of physical instruments, measurement and research equipment	Knowledge of the construction, operation, and application of vacuum devices.	[SW1] Assessment of factual knowledge
	[K6_W08] has knowledge of planning and conducting physical experiments, and critical analysis of its results	Ability to plan and conduct a laboratory experiment.	[SW3] Assessment of knowledge contained in written work and projects
Subject contents	Course content – lecture Lecture 1) The concept of vacuum 2) Selected properties of gases 3) Absorption and adsorption of gases 4) Gas flow 5) Vacuum generation <ul style="list-style-type: none"> Mechanical vacuum pumps Jet vacuum pumps Sorption pumps 6) Vacuum measurement 7) Mass spectrometry 8) Leak Detection		
	Course content – laboratory Laboratory <ul style="list-style-type: none"> Assembly of a vacuum system with a pump, valve, and measuring head. Disassembly and assembly of a rotary vane pump and a diffusion pump. Operation of a vacuum system with a turbomolecular pump and a wide-range gauge. Effective pumping speed; characteristics of a dosing valve. 		
Prerequisites and co-requisites	None		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Laboratories: reports	100.0%	0.0%
	Lecture: online quizzes	0.0%	12.0%
	Laboratory: performance of 4 laboratory experiments	100.0%	0.0%
	Laboratories: oral assessment	50.0%	50.0%
	Lecture: final test	50.0%	38.0%
Recommended reading	Basic literature	S. Bielski, materials published on the moodle platform "Modern vacuum physics" Austin Chambers CRC Press 2004 Fundamentals of leak detection, Leybold GmbH, 2024 https://www.leybold.com/content/dam/brands/leybold/downloads/gated/Fundamentals-of-leak-detection-2024.pdf	

	Supplementary literature	Materials and data available on the websites https://www.leyboldproducts.com/media/pdf/87/a8/be/FVT_Fundamentals_of_Vacuum_Technology_EN58774555441f3.pdf http://www.idealvac.com/files/manuals/Kinney_Piston_Vacuum_Pump_Brochure.pdf https://www.agilent.com/cs/library/usermanuals/Public/6999-01-140C_Eng%20High%20Throughput%20Diffusion%20Pumps%20Brochure.pdf http://www.idealvac.com/files/literature/03_Edwards_2011_Vapour_Diffusion_Pumps.pdf http://www.idealvac.com/files/brochures/Pfeiffer-Adixen-Leak-Detectors-Brochure.pdf
	eResources addresses	
Example issues/ example questions/ tasks being completed	<p>Lecture</p> <p>Discuss the physical principles of operation of an ionization vacuum gauge. Discuss the construction, operating principle, and properties of a rotary pump.</p> <p>Laboratory</p> <p>Assemble a vacuum system with a pump, valve, and measuring head. Measure the effective pumping speed of the given system.</p>	
Practical activities within the subject	Not applicable	

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