GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Vacuum technology, PG_00037288		
Field of study	Technical Physics		
Date of commencement of studies	October 2023	Academic year of realisation of subject	2025/2026
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	Katedra Fizyki Atomowej i Luminescencji -> Faculty of Applied Physics and Mathematics -> Wydziały Politechniki Gdańskiej		
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

eNauczanie source addresses:

Moodle ID: 42925 Technika próżniowa_25/26
https://enauczanie.pg.edu.pl/moodle/course/view.php?id=42925

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

The aim of the course is to provide knowledge of modern vacuum technology, with particular focus on the following topics:

- 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_U02] Can analyze and solve 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 [SU2] Assessment of ability to analyse information
[K6_W07] Has knowledge of the construction and operation of physical instruments, measurement and research equipment.	The knowledge about construction, operation and use 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.	[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects
[K6_U04] Can plan and conduct experiments, critically analyze their results, draw conclusions and form opinions. Has laboratory work experience.	Practical laboratory experience in the Vacuum Technics Laboratory	[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools

Subject contents

Lecture

1) The concept of vacuum
2) Selected properties of gases
3) Absorption and adsorption of gases
4) Gas flow
5) Vacuum generation

- Mechanical vacuum pumps
- Jet vacuum pumps
- Sorption pumps

6) Vacuum measurement
7) Leak Detection
8) Elements of vacuum systems

Laboratory

- 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
Lecture: online quizzes	0.0%	12.0%
Lecture: final test	50.0%	38.0%
Laboratories: reports, oral presentations	100.0%	50.0%

Recommended reading

Basic literature	S. Bielski, materials published on the moodle platform https://enauczanie.pg.edu.pl/moodle/course/view.php?id=42925 "Modern vacuum physics" Austin Chambers CRC Press 2004
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%2 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	**Lecture** Discuss the physical principles of operation of an ionization vacuum gauge. Discuss the construction, operating principle, and properties of a rotary pump. **Laboratory** Assemble a vacuum system with a pump, valve, and measuring head. Measure the effective pumping speed of the given system.
Work placement	Not applicable

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