GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Vacuum technique, PG_00053365		
Field of study	Biomedical Engineering, Biomedical Engineering, Biomedical Engineering		
Date of commencement of studies	October 2024	Academic year of realisation of subject	2025/2026
Education level	second-cycle studies	Subject group	Optional subject group Specialty 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	2	Language of instruction	Polish
Semester of study	3	ECTS credits	2.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Institute of Physics and Applied Computer Science -> Faculty of Applied Physics and Mathematics		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Sebastian Bielski	
	Teachers		

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
[K7_U02] can perform tasks related to the field of study as well as formulate and solve problems applying recent knowledge of physics and other areas of science	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
[K7_K01] is ready to create and develop models of proper behaviour in the work and life environment; undertake initiatives; critically evaluate actions of their own, teams and organisations they are part of; lead a group and take responsibility for its actions; responsibly perform professional roles taking into account changing social needs, including: - developing the achievements of the profession, - observing and developing rules of professional ethics and acting to comply to these rules	Students plan and conduct experiments and prepare reports by working in groups.	[SK2] Assessment of progress of work
[K7_W02] knows and understands, to an increased extent, selected laws of physics and physical phenomena, as well as methods and theories explaining the complex relationships between them, constituting advanced general knowledge in the field of technical sciences related to the field of study	The student gains knowledge about construction, operation and use of vacuum devices.	[SW1] Assessment of factual knowledge

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

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 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=23587 • "Modern vacuum physics" Austin Chambers CRC Press 2004
Supplementary literature	Materials and data available on the websites: • https://www3.nd.edu/~nsl/Lectures/urls/LEYBOLD_FUNDAMENTALS.pdf • http://www.idealvac.com/files/manuals/Kinney_Piston_Vacuum_Pump_Brochure.pdf • https://www.agilent.com/cs/library/catalogs/public/05_Diffusion_Pumps.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	Adresy na platformie eNauczanie:

Example issues/ example questions/ tasks being completed

- Project of a UHV system.
- Physical basis of vaccum measurements.
- Construction, operation and properties of a rotary pump.

Work placement

Not applicable