GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Thin film technologies, PG_00058947		
Field of study	Nanotechnology		
Date of commencement of studies	October 2024	Academic year of realisation of subject	2025/2026
Education level	first-cycle studies	Subject group	Obligatory subject group in the field of study 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	4	ECTS credits	4.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Institute of Nanotechnology and Materials Engineering -> Faculty of Applied Physics and Mathematics -> Wydziały Politechniki Gdańskiej		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Marcin Łapiński	
	Teachers		

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	0.0	30.0	0.0	0.0	45

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	45	5.0	50.0	100

Subject objectives

The aim of the course is to give information with the techniques (both, production and analysis) used in thin-film technology.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_U10] can forecast and assess potential negative biological and ecological effects of producing nanostructures on an industrial scale and their practical application.	The student is able to plan and conduct an experiment, paying particular attention to energy consumption and other environmental aspects.	[SU1] Assessment of task fulfilment [SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools [SU5] Assessment of ability to present the results of task
[K6_U06] can accurately present technological and scientific problems, related to the production and application of nanostructures, to specialists in related fields, and initiate and coordinate interdisciplinary cooperation.	The student knows the techniques of manufacturing and analyzing thin films. Has the necessary theoretical knowledge and uses professional terminology	[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information
[K6_W05] has knowledge of inorganic and organic chemistry, physical chemistry and chemical thermodynamics.	The student is able to solve scientific and technological problems related to thin films	[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects

<table>
<tr><td>Subject contents</td><td>Lecture

1. Nanothermodynamics,
2. Manufacturing of the thin films,
3. Properties,
4. Analysis of the thin films,
5. Applications,

Laboratory:

Planning the experiment and deposition of thin metallic films using two PVD methods and an oxide layer using the CVD method. Measurement of their mechanical and optical properties.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>Passed the exam in the listed below subjects

Technologie Otrzymywania Nanomateriałów

Fizyczne Metody Badań Materiałów

Termodynamika

Krystalografia</td></tr>
<tr><td>Assessment methods and criteria</td><td><table><tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr><tr><td>exam</td><td>51.0%</td><td>60.0%</td></tr><tr><td>lab report</td><td>51.0%</td><td>40.0%</td></tr></table></td></tr>
<tr><td>Recommended reading</td><td><table><tr><td>Basic literature</td><td>Books and papers. Like eg.

Krishna Seshan, "Handbook of Thin Film Deposition"

Hartmut Frey, "Handbook of Thin Film Technology"

Stine, Keith J. "Materials Processing for Production of Nanostructured Thin Films",</td></tr><tr><td>Supplementary literature</td><td>Technological news from journals</td></tr><tr><td>eResources addresses</td><td></td></tr></table></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td>Design of a photochromic coating for eyeglass lenses

Examination of the properties of an ultrathin dielectric layer

Seeding thin gold layers on various substrates</td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
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