GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Laser technology, PG_00020932		
Field of study	Nanotechnology		
Date of commencement of studies	October 2020	Academic year of realisation of subject	2022/2023
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	3	Language of instruction	Polish
Semester of study	5	ECTS credits	4.0
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 hab. inż. Ryszard Barczyński	
	Teachers	dr hab. inż. Ryszard Barczyński dr hab. Mateusz Zawadzki	

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	Introduction to the design, operation and use of lasers. The study of basic properties and applications of laser light.

Learning outcomes

Course outcome	Subject outcome	Method of verification
K6_W09	The student has a basic knowledge of the construction of devices using lasers and their applications.	[SW1] Assessment of factual knowledge
K6_U04	The student conducts and analyzes the experiment with the use of laser light.	[SU2] Assessment of ability to analyse information
K6_W03	The student has systematic knowledge of wave optics and the principles of operation and construction of lasers.	[SW1] Assessment of factual knowledge

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

Fundamentals of lasers. Einstein coefficients.

Widening of the spectral line.

Pumping.

Optical resonators, Longitudinal and transverse modes.

Features of laser light.

Solid state lasers,

Gas lasers,

Semiconductor lasers,

Other types of lasers.

Lasers in materials science.

LABORATORY: EXERCISES
1) Measurement of laser-excited emission spectra of dye solutions.

2) Investigation of diffraction and interference of laser light.

3) Investigation of the Debye-Sears effect (diffraction of the laser light on acoustic standing wave).

4) Investigation of the electro-optic effect

LABORATORY: PROBLEMS

Construction and applications of modern laser systems</td></tr>
<tr><td>Prerequisites and co-requisites</td><td></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>Written test of knowledge</td><td>51.0%</td><td>50.0%</td></tr>
<tr><td>Completing all laboratory exercises, reports, oral presentations</td><td>51.0%</td><td>50.0%</td></tr>
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<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>1. K. Tyagarajan, A. Ghatak, Lasers fundamentals and applications
2. F. Trager (Ed.), Springer Handbook of Lasers and Optics</td></tr>
<tr><td>Supplementary literature</td><td>1. W. M. Steen, J. Mazumder, Laser material processing, Springer, 2010.</td></tr>
<tr><td>eResources addresses</td><td>Adresy na platformie eNauczanie:
Technika laserowa 2022/2023 - Moodle ID: 25889
https://enauczanie.pg.edu.pl/moodle/course/view.php?id=25889</td></tr>
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<tr><td>Example issues/ example questions/ tasks being completed</td><td>1. Properties of the laser light.
2. Methods of creation of short laser pulses.
3. Applications of lasers in medicine</td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
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