



## 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		

Subject contents	<p>LECTURE</p> <p>Fundamentals of lasers. Einstein coefficients.</p> <p>Widening of the spectral line.</p> <p>Pumping.</p> <p>Optical resonators, Longitudinal and transverse modes.</p> <p>Features of laser light.</p> <p>Solid state lasers,</p> <p>Gas lasers,</p> <p>Semiconductor lasers,</p> <p>Other types of lasers.</p> <p>Lasers in materials science.</p> <p>LABORATORY: EXERCISES</p> <p>1) Measurement of laser-excited emission spectra of dye solutions.</p> <p>2) Investigation of diffraction and interference of laser light.</p> <p>3) Investigation of the Debye-Sears effect (diffraction of the laser light on acoustic standing wave).</p> <p>4) Investigation of the electro-optic effect</p> <p>LABORATORY: PROBLEMS</p> <p>Construction and applications of modern laser systems</p>											
Prerequisites and co-requisites												
Assessment methods and criteria	<table border="1"> <thead> <tr> <th data-bbox="456 1312 794 1339">Subject passing criteria</th> <th data-bbox="799 1312 1137 1339">Passing threshold</th> <th data-bbox="1142 1312 1469 1339">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="456 1346 794 1373">Written test of knowledge</td> <td data-bbox="799 1346 1137 1373">51.0%</td> <td data-bbox="1142 1346 1469 1373">50.0%</td> </tr> <tr> <td data-bbox="456 1379 794 1440">Completing all laboratory exercises, reports, oral presentations</td> <td data-bbox="799 1379 1137 1440">51.0%</td> <td data-bbox="1142 1379 1469 1440">50.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Written test of knowledge	51.0%	50.0%	Completing all laboratory exercises, reports, oral presentations	51.0%	50.0%
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Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none"> <li>1. Properties of the laser light.</li> <li>2. Methods of creation of short laser pulses.</li> <li>3. Applications of lasers in medicine</li> </ol>											
Work placement	Not applicable											