



Subject card

Subject name and code	Atomic and molecular physics II, PG_00039517						
Field of study	Technical Physics						
Date of commencement of studies	February 2024	Academic year of realisation of subject			2024/2025		
Education level	second-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	1	Language of instruction			Polish		
Semester of study	2	ECTS credits			4.0		
Learning profile	general academic profile	Assessment form			exam		
Conducting unit	Zakład Fizyki Atomowej, Molekularnej i Optycznej -> Instytut Fizyki i Informatyki Stosowanej -> Faculty of Applied Physics and Mathematics						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. Paweł Możejko				
	Teachers		dr hab. Paweł Możejko				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	15.0	0.0	0.0	15.0	60
	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	60		8.0		32.0	100
Subject objectives	Presentation of selected topics related to the light interaction with atomic systems (lecture, exercises). Presentation of selected computational methods of the atomic and molecular physics (lecture, exercises). Presentation of selected topics in atomic and molecular physics (seminars).						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K7_W02] Has enhanced, theoretically-founded, detailed knowledge of selected field of physics, and sufficient knowledge of related fields of science or technology.		A student knows the basics of relativistic quantum mechanics and selected examples of applications in atomic physics.		[SW1] Assessment of factual knowledge		
	[K7_K03] Can cooperate and work in a group, performing different functions. Can make self-assessment, as well as constructively assess the effects of other persons' work.		The student is able to prepare and conduct a seminar presentation. Can take part in a discussion of another person's seminar presentation.		[SK1] Assessment of group work skills [SK4] Assessment of communication skills, including language correctness		

Subject contents	Lectures, exercises: 1. Creation and annihilation operators 2. Time dependent perturbation theory 3. Quantization of the electromagnetic field 4. Interaction of atomic systems with light 5. Electronic structure of molecules 6. Oscillatory structure of molecules 7. Rotational structure of molecules 8. Basic methods of quantum chemistry											
Prerequisites and co-requisites	Knowledge of elementary quantum mechanics.											
Assessment methods and criteria	<table border="1" data-bbox="448 860 1487 965"> <thead> <tr> <th data-bbox="448 860 798 898">Subject passing criteria</th> <th data-bbox="802 860 1141 898">Passing threshold</th> <th data-bbox="1145 860 1487 898">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="448 904 798 931">Writing exam</td> <td data-bbox="802 904 1141 931">50.0%</td> <td data-bbox="1145 904 1487 931">50.0%</td> </tr> <tr> <td data-bbox="448 938 798 965">Seminar</td> <td data-bbox="802 938 1141 965">50.0%</td> <td data-bbox="1145 938 1487 965">50.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Writing exam	50.0%	50.0%	Seminar	50.0%	50.0%
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Recommended reading	<table border="1" data-bbox="448 972 1487 1285"> <tbody> <tr> <td data-bbox="448 972 798 1211">Basic literature</td> <td colspan="2" data-bbox="802 972 1487 1211"> S. Kryszewski "Mechanika kwantowa" Wyd. UG L. Pielak "Idee Chemii Kwantowej" PWN </td> </tr> <tr> <td data-bbox="448 1218 798 1245">Supplementary literature</td> <td colspan="2" data-bbox="802 1218 1487 1245">W. Greiner, Relativistic quantum mechanics, Springer, Berlin, 1994</td> </tr> <tr> <td data-bbox="448 1252 798 1285">eResources addresses</td> <td colspan="2" data-bbox="802 1252 1487 1285">Adresy na platformie eNauczanie:</td> </tr> </tbody> </table>			Basic literature	S. Kryszewski "Mechanika kwantowa" Wyd. UG L. Pielak "Idee Chemii Kwantowej" PWN		Supplementary literature	W. Greiner, Relativistic quantum mechanics, Springer, Berlin, 1994		eResources addresses	Adresy na platformie eNauczanie:	
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Example issues/ example questions/ tasks being completed	Problem of two-level atomic system interacting with light											
Work placement	Not applicable											