University of Gdańsk

Subject card

Subject name and code	Physics II, PG_00080834		
Field of study	Chemical Business		
Date of commencement of studies	October 2024	Academic year of realisation of subject	2024/2025
Education level	Bachelor's studies	Subject group	Obligatory subject group 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 NA
Semester of study	2	ECTS credits	2.0
Learning profile	academic	Assessment form	exam
Conducting unit	Faculty of Mathematics, Physics and Informatics -> Rector		
Name and surname of lecturer (lecturers)	Subject supervisor	dr Joanna Gondek	
	Teachers	dr Joanna Gondek	

Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	0.0	0.0	0.0	15
	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	15	2.0	33.0	50

Subject objectives	
	to familiarise students with all the issues mentioned in the lecture content,to acquaint students with fundamentals of quantum physicsto acquaint students with basic models describing energy structure of atoms, multi-atomic particles and solids (crystals).to teach students to carry out physical experiments on their own (using descriptions included in the instructions).to develop the ability to critically evaluate and interpret experimental results obtained, and to analyse source texts

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[BCHINŻ_U09] Using the acquired knowledge, skills and various sources of scientific information independently prepares written papers and oral presentations.	Using concepts from quantum physics to describe atoms molecules and electrons. Knowledge of the fundamentals of the energy structure of atoms, molecules and solids. Ability to interpret absorption and luminescence spectra.	[SU4] test/exam - oral or written
	[BCHINŻ_K04] Demonstrates responsibility for the safety of her/ his own and others' work.	1. understanding the need for continuing education, 2. to take care of the laboratory equipment entrusted to them 3. to exercise due care in the handling of laboratory equipment	[SK4] test/exam - oral or written
	[BCHINŻ_K03] Independently sets or implements a set action plan specifying priorities for its implementation; critically assesses its progress.	1. understanding the need for continuing education, 2. to take care of the laboratory equipment entrusted to them 3. to exercise due care in the handling of laboratory equipment and in handling chemical reagents 4. to be able to work as part of a team according to his/her role in the team (leader of the group leader/member of a group) 5. awareness of the need to critically analyse own work 6. cautious criticism in accepting information, especially that available in the mass media 7. awareness of the need to work honestly and diligently	[SK4] test/exam - oral or written
	[BCHINŻ_W02] Enumerates basic laws and theories in chemistry, physics and mathematics necessary to formulate and solve simple engineering tasks.	Understanding of the wave nature of particles and the resulting consequences Knowledge of the structure of one-electron and many-electron atoms Knowledge of the energy structure of molecules and crystals Knowledge of basic apparatus for spectral measurements and X-ray diffraction	[SW4] test/exam - oral or written
	[BCHINŻ_W03] Describes the techniques of higher mathematics and IT tools necessary to describe and model chemical phenomena and technological processes.	Understanding of the wave nature of particles and the resulting consequences Knowledge of the structure of one-electron and many-electron atoms Knowledge of the energy structure of molecules and crystals Knowledge of basic apparatus for spectral measurements and X-ray diffraction	[SW4] test/exam - oral or written
	[BCHINŻ_K02] Works individually demonstrating initiative and independence in actions, and effectively cooperates in a team, performing various roles in it.	1. understanding the need for continuing education, 2. to take care of the laboratory equipment entrusted to them 3. to exercise due care in the handling of laboratory equipment and in handling chemical reagents 4. to be able to work as part of a team according to his/her role in the team (leader of the group leader/member of a group) 5. awareness of the need to critically analyse own work 6. cautious criticism in accepting information, especially that available in the mass media 7. awareness of the need to work honestly and diligently	[SK4] test/exam - oral or written

Subject contents	Corpuscular-wave duality and the foundations of quantum physicsFirst quantisationBosons and fermionsFermi-Dirac and Bos-Einstein statisticsHamiltonian free electron operator; density of statesParticle in a well of potentialSingle-electron atom, multi-electron atomQuantum numbers.Electron transitions with emission and absorption of photonsParticles (electron spectra, oscillatory and rotational spectra)Band structure of crystalsMethods of measuring the properties of atoms, molecules and crystals optical and X-ray spectroscopy
Prerequisites and co-requisites	Basic knowledge of physics within the scope of the physics lecture for chemistry students, basic knowledge of mathematical analysis within the scope of the application of differential and integral calculus

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
exam	51.0%	100.0%

Recommended reading

Basic literature	D. Holliday, R. Resnick , J. Walker Fundamentals of Physics vol. 5Z. Les Fundamentals of the Physics of the Atom
Supplementary literature	R. Feynman, R. B. Leighton, M. Sands, Feynman lectures in physics, vol. 3C. Kittel , Introduction to solid state physics
eResources addresses	

Example issues/ example questions/ tasks being completed	NA
Work placement	Not applicable

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