University of Gdańsk

Subject card

Subject name and code	Nuclear and Elementary Particles Physics, PG_00182654		
Field of study	Physics		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2026/2027
Education level	Master's studies	Subject group	Obligatory subject group in the field of study 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	6.0
Learning profile	academic	Assessment form	exam
Conducting unit			
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Angelina Łobejko	
	Teachers	dr inż. Angelina Łobejko	

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	15.0	30.0	0.0	0.0	75

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	75	0.0	75.0	150

Subject objectives

Deepening and systematising students' knowledge of the structure and properties of atomic nuclei and elementary particles, with particular emphasis on contemporary experimental methods and a small amount of theoretical considerations. Another important element is to show the connections between nuclear and particle physics and other areas of research (astrophysics, condensed matter physics, medical and technological applications).

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[FIZMU2_U01] is able to apply the scientific method in solving physical problems, conducting experiments and reasoning	The student is able to independently apply the scientific method in solving advanced problems related to the structure and properties of atomic nuclei and elementary particles. They are able to plan and carry out nuclear and particle experiments, selecting appropriate theoretical models, computational methods and measurement tools. The student is able to analyse the results of experiments and calculations, interpret them critically and formulate conclusions in line with the current state of knowledge in the field of nuclear physics and elementary particles.	[SU2] presentation/project/paper/ report [SU3] text preparation/written work [SU4] test/exam - oral or written
	[FIZMU2_K01] knows the limitations of his own knowledge and skills; can formulate questions precisely; understands the need for further education and other	The student is aware of the limitations of their knowledge and skills in nuclear physics and elementary particles and is able to precisely formulate research questions concerning complex experimental and theoretical problems. They are open to the need for further self-education, following current trends in nuclear physics and elementary particle physics research, and supporting the development of others' knowledge through teamwork and teaching. The student appreciates the importance of exchanging experiences and information in research and teaching, actively participating in team activities, as well as supporting the development of others' knowledge and promoting a culture of continuous learning.	[SK1] oral statement/conversation/ discussion [SK3] text preparation/written work
	[FIZMU2_W06] has knowledge of the current directions of development of physics and fundamental dilemmas of modern civilization	The student has in-depth knowledge of current research trends in nuclear physics and elementary particle physics, including the latest experimental and theoretical achievements. They understand the fundamental challenges and dilemmas of contemporary science and civilisation resulting from the applications of nuclear energy, radioactive technologies and research on elementary particles. They are able to assess the significance of these discoveries in the broader context of natural sciences, technology and society	[SW4] test/exam - oral or written [SW3] text preparation/written work
	[FIZMU2_K02] is aware of the conclusive role of experiment in the verification of physical theories; is aware of the scientific method in the accumulation of knowledge	The student is aware of the key role of experimentation in verifying models and theories in nuclear physics and elementary particle physics. They understand the importance of the scientific method in gathering and critically evaluating knowledge, and are able to appreciate the value of reliable experimental data and a systematic approach to solving scientific problems. The student demonstrates an open attitude towards new research results and is ready to apply the scientific method in teamwork and research.	[SK2] presentation/project/paper/ report [SK3] text preparation/written work [SK4] test/exam - oral or written

Course outcome	Subject outcome	Method of verification
[FIZMU2_K08] is ready to form competent opinions on advanced professional issues and opinions on certain issues of public interest	The student is ready to formulate competent opinions on advanced issues in nuclear physics and elementary particles, including nuclear processes, fundamental interactions and applications of ionising radiation. They are eager to take on challenges to present reliable, scientifically based opinions on issues in nuclear physics and nuclear technology that may be the subject of public debate, taking into account aspects of safety, ethics and impact on society.	[SK1] oral statement/conversation/ discussion [SK4] test/exam - oral or written
[FIZMU2_U09] can work independently or in a team	The student is able to independently carry out research and experimental tasks in the field of nuclear physics and elementary particles, planning experiments, analysing data and formulating conclusions. They are also able to cooperate effectively in a research team, sharing knowledge, experience and measurement results, as well as contributing to the joint solving of scientific problems and interpretation of experimental results.	[SU8] observation of student's independent or team work
[FIZMU2_W01] has advanced knowledge of general physics and in-depth knowledge of various areas of physics; knows the history of the development of physics and its importance for the progress of exact and natural sciences, cognition of the world and social development	The student has in-depth knowledge of the properties and structure of atomic nuclei, as well as the mechanisms of nuclear interactions and the processes of nuclear decay and reactions. Students have detailed knowledge of the interaction of ionising radiation with matter and its impact on living organisms. In addition, students have knowledge of the types of elementary particles, their properties and the fundamental interactions between them, understanding how these processes affect the structure of matter and the phenomena observed in nuclear and particle experiments. In addition, students understand the relationships between nuclear physics and particle physics, as well as their significance for other fields of science.	[SW4] test/exam - oral or written [SW3] text preparation/written work

Subject contents	not applicable
Prerequisites and co-requisites	A. Formal requirements: Fundamentals of classical physics, Fundamentals of quantum physics. B. Prerequisites: Knowledge of issues related to the structure of the atom. Knowledge of the fundamentals of mechanics and the fundamentals of differential and integral calculus.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
colloquium	51.0%	20.0%
exam	51.0%	50.0%
report	51.0%	30.0%

Recommended reading	Basic literature	not applicable
	Supplementary literature	not applicable
	eResources addresses	
Example issues/ example questions/ tasks being completed	not applicable	
Work placement	Not applicable	

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